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FLORAE MALESIANAE PRECURSORES I.
XYRIDACEAE

by

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(Rijksherbarium, Leiden)

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Xyris malmei sp. nov. — Folia ensiformia, 7—30 cm longa, subfalcata, minute papillosa. Scapus 20—45 cm longus, teres vel subteres, papillatus. *Bracteae* ovatae ad ellipticae, obtusae, emarginatae vel retusae; bracteae basales cum nervo uno completo et nervis 4 descendentibus incompletis. *Sepala* lateralia naviculata, cum carina glabra carinata. *Petala* obovata, 8—9 mm longa, ungui 7—8 mm longo. Stamina 3—4.5 mm longa, antherae basi obtuse, apice profunde incisae, thecarum apex acute bifidus. *Staminodia* penicillata. Ovarium obovoideum. Stylus trifidus, ramulis apice capitatis.

Typus: Robinson & Kloss 5962, in K: Malay Peninsula, Kedah Peak, 850—1200 m, Dec. 1915.

Haec species *X. bancana, X. oreophila* et *X. lobbii* affinis, cum characteribus illarum specierum. Differt a *X. lobbii* foliis obtusis margine crassiore absentibus, scapo tereti ad subtereti ecostato, sepalorum lateralium carina angusta integra et thecarum apice. Differt a *X. oreophila* thecarum apice et basi divisis et bractearum papillis in regione apicali angusto. Differt a *X. bancana* pedunculo ecostato, sepalorum lateralium carina integra et foliorum vagina longiori.

Xyris papuana sp. nov. — Folia lineari-ensiformia, tortuosa, obtusa, 20—45 cm longa, papillata. Scapus 20—55 cm altus, teretiusculus, costatus, costa una vel costis pluribus. *Bracteae* ovatae ad orbiculares, margine apicali lacerato usque fimbriato, nervo completo uno munitae et nervis c. 25 descendentibus incompletis in bracteis basalibus; bracteae centrales nervis 14 descendentibus et nervo completo uno munitae. *Sepala* lateralia naviculata, obtusa, apice ciliata, carinata, carina integra vel minute dentata, alis apice ciliatis. *Petala* cuneata, c. 3 mm longa et lata, ungui 5—6 mm longo. Stamina 1.5—2 mm longa, antherae c. 1 mm longae, basi subobtuso aut mucronato, apice profunde inciso, thecarum apice acute uni- vel bidentato. *Staminodia* penicillata. Ovarium obovoideum, truncatum, 3-loculatum. Stylus trifidus, ramulis apice capitatis.

Typus: Buwalda 5495 in L; Moluccae merid., Insulae Aru, Trangan, Popjetu, in graminosis (*Imperata*); flores flavi, Julio 6, 1938.

Haec species *X. bancana, X. lobbii, X. ridleyi* et *X. borneensi* affinis, sed differt vagina pro foliis breviori et bracteis; bractearum margo apicalis laceratus, nervis descendentibus multis.

Xyris chlorocephala sp. nov. — Folia 35—65 cm longa, ensiformia, acuminata, glabra. Scapus 25—65 cm longus, recte infra capitulum applanatus. *Bracteae* naviculatae et carinatae vel ovatae ad squamatae et minute spinulosae, nervo completo uno et nervis lateralibus descendentibus incompletis. *Sepala* lateralia naviculata, obtusa, cristata, crista apice abrupte attenuata. *Petala* usque 15 mm longa, suborbiculata, limbo usque ad 7 mm longo, 3—4 mm lato. Stamina 3—3.5 mm longa; antherae 2—2.5 mm longae, connectivo dilatato, thecae apice acute bifidae, basi mucronatae, loculis internis quam exterioribus brevioribus. *Staminodia* penicillata. Ovarium ellipsoideum, basi attenuatum, 3-loculare. Stylus trifidus, ramulis linearibus. Capsula ovario similis.

Typus: Jacobson 13 in L; Sumatra occid., Serasah Bunta, prope Pajokumbuh, 500 m, Aug. 20, 1929.

X. grandi affinis sed differt foliis angustioribus, pedunculo infra capitulum applanato, bractearum areis minute papillatis destitutis, sepalis lateralibus crista apicem versus abrupte angustata, staminodiis, antherarum flavarum loculis internis brevioribus et thecarum basi mucronato.

Xyris flabellata sp. nov. — Folia 2.5—9.5 cm longa, ensiformia, equitantia, acuta, nervo singulo robusto cavo marginem versus, papillata. Scapus 8—28 cm longus, teretiusculus, unicostatus, papillatus. *Bracteae* ovatae, obtusae, conspicue cristatae et munitae nervo uno completo et nervis 4 descendentibus incompletis. Bracteae medianae obovatae, in parte apicali cristatae et minute papillatae, nervis 5 vel 6 completis munitae. *Sepala* lateralia naviculata obtusa anguste cristata, crista integra. *Petala* elliptica ad orbicularia, 3.5—4.5 mm longa, ungui 4.5—5.5 mm longo. Stamina c. 2 mm longa; antherae 1—1.5 mm longae, apice retusae; thecarum apex acute bidentatus, basis mucronata, connectivum membranaceo-dilatatum. *Staminodia* bifida penicillata, 1—2 mm longa. Ovarium fusiforme vel obovoideum, 3-angulare, 3-loculare, 3—4 mm longum. Stylus trifidus, ramulis apice capitatis. Fructus ovario similis.

Typus: Van Steenis 8430 in L; Sumatra septentr., Atjeh, Mt Losir, Bivak II, 2500 m, Jan. 29, 1937.

Haec species parvifolia facile distinguenda est foliis equitantibus in natura formantibus "cristas" conspicuas. Differt a speciebus ceteris omnibus nervis foliis robustis cavis.

Xyris dajacensis sp. nov. — Folia linearia, 5—16 cm longa, acuta, saepe tortuosa, papillata et interdum margine solum. Scapus 8—60 cm longus, costatus, applanatus et interdum in parte basali teres, tortuosus, pars apicalis scabriuscula, pars basalis glabra. *Bracteae* centrales late ovatae ad orbiculares, apice munitae dente cavo papillis numerosis munito, apice integrae vel emarginatae, marginibus integris vel scariosis, nervis 5—7 completis interdum furcatis. *Sepala* lateralia naviculata, acuta, distincte cristata, carinae parte apicali pauci-dentata. *Petala* obovato-cuneata, 3—4 mm longa, limbo 2—2.5 mm longo, 1.5—2 mm lato, ungui c. 2 mm longo. Stamina c. 0.8 mm longa; antherae c. 0.6 mm longae, apice et basi profunde incisae; thecarum basis et apex obtusi. Ovarium obovoideum, 3-sulcatum, 3-loculare. Stylus trifidus, alis praeter ovarium decurrentibus quorum 2 latis et una angusta, stigmato flabelliformi, in infundibulum triquetrum unito.

Typus: Ramos 1405 in L; Borneo anglica, Sandakan, Sept.—Dec. 1920.

Haec species *X. complanata* similis sed differt thecarum apice et basi obtusis et bracteis spinulosis et foliorum margine ecostato. *X. pauciflora* similis sed bracteis areis papillosis majoribus et antheris differt. Insuper differt a *X. pauciflora* foliis in marginibus cellulis incrassatis munitis.

Xyris ridleyi Rendle var. **penicillata** var. nov. — Differt a *var. ridleyi* staminodiis penicillatis.

Typus: Smith s.n. in BM; Cambodia, Boclar (?), Mart. 1924.

FLORAE MALESIANAE PRECURSORES II. THE CONVOLVULACEAE OF MALAYSIA IX [1]

by

R. D. HOOGLAND [2]

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New species of Erycibe

Erycibe beccariana Hoogl. sp. nov. — Frutex scandens, ramulis junioribus sparsim stellato-hirsutis, adultioribus glabrescentibus cortice rimis longitudinalibus fisso. *Folia* elliptica ad elliptico-oblonga, 9—13 × 4—7½ cm, apice breviter acuminata, basi rotundata vel minute cordata, supra glabra, subtus sparsim stellato-hirsuta, glabrescentia; petiolus 8—13 mm longus. *Inflorescentiae* axillares, paniculatae, c. 6—12-florae, 1—2 cm longae, stellato-hirsutae, bracteis minutis, caducis. *Flores* pedicello 2—4 mm longo bracteolis 2 minutis, caducis. *Sepala* 2 exteriora transverso-ovalia, c. 2.5 × 3 mm, 2 interiora transverso-elliptica, c. 2.7 × 4.5 mm, extus stellato-hirsuta, intus glabra. *Corolla* c. 8.5 mm longa; areae mesopetalinae c. 4 × 3 mm, adpresso-hirsutae pilis praesertim 4—6-ramosis; lobuli c. 3.6 mm longi, 3 mm lati, margine undulati. *Stamina* c. 1.1 mm supra corollae basin inserta, filamento 1.6 mm longo, basi c. 0.6 mm lato, anthera c. 2.3 mm longa, 1 mm lata, 0.8 mm crassa, apice acuminata acumine sterili c. 0.6 mm longo, basi subcordata. *Ovarium* ellipsoideum, c. 1.1 mm longum, 1.8 mm diam., glabrum; stigma conicum, c. 1 mm altum, 1.8 mm diam., radiatim 10-carinatum carinis 5 maioribus 5 minoribus alternantibus.

Types: Beccari P.P. 91, holotype in FI; paratype: *Beccari P.P. 532* (FI). *New Guinea.*

Erycibe borneensis (Merr.) Hoogl. comb. nov. — *Fissipetalum borneense* Merr., J. Str. Br. R. A. S. 85, 1922, p. 168.

Types: Ramos 1454, lectotype in K, isotypes in A, B.

Var. **collina** Hoogl. var. nov. — Differt a var. *borneensi* foliis subminoribus (8—12 × 2½—5 versus 9—22 × 3½—9 cm in var. *borneensi*) et sepalis extus densiuscule stellato-hirsutis, ramis pilorum ad 500 μ longis

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[1] I—VII by S. J. van Ooststroom, VIII by R. D. Hoogland in Blumea VII, 1, 1952, p. 179—192.

[2] Now C. S. I. R. O., Canberra, A. C. T., Australia.

(in var. *borneensi* sepalis extus sparsim stellato-hirsutis, ramis pilorum ad 200 μ longi).

Types: Clemens 40357, holotype in L, isotypes in A, BM, BO, G, K, UC; paratypes: *Clemens 40258* (A, BM, BO), *Clemens 40388* (BM, K, SING), *Clemens 40418 A* (BM, L), *Clemens 40418 B* (BM), *Clemens 40438* (BM), *Hose 627* (BM, K), *Hose 645* (K). *Borneo.*

Erycibe brassii sp. nov. — Frutex scandens, ramulis junioribus stellato-hirsutis, adultioribus glabrescentibus cortice rimis longitudinalibus fisso. *Folia* elliptico-oblonga ad ovato-oblonga, 7.5—16 × 4.2—6.5 cm, apice breviter acuminata, basi acuta, supra sparsim stellato-hirsuta, glabrescentia, subtus stellato-hirsuta, glabrescentia; petiolus 7—11 mm longus. *Inflorescentiae* axillares, paniculatae, (3—)8—12-florae, 1—2.5 cm longae, stellato-hirsutae, bracteis minutis, caducis. *Flores* pedicello 2.5—4 mm longo bracteolis 2 minutis, caducis. *Sepala* transverso-elliptica, c. 2.7 × 3.5 mm, extus stellato-hirsuta, intus glabra. *Corolla* c. 8 mm longa; areae mesopetalinae c. 4 × 2 mm, adpresso-hirsutae pilis praesertim 2-ramosis; lobuli c. 3.8 mm longi, 3 mm lati. *Stamina* c. 0.8 mm supra corollae basin inserta, filamento triangulare c. 1 mm longo, basi 0.6 mm lato, anthera c. 1.8 mm longa, 1 mm lata, 0.7 mm crassa, apice acuminata acumine sterili c. 0.5 mm longo, basi cordata. *Ovarium* ellipsoideum, c. 1.4 mm longum, 1.1 mm diam., parte inferiore (c. 0.8 mm) glabra, parte superiore stellato-hirsuta; stigma conicum, c. 0.8 mm altum, 1.1 mm diam., radiatim 10-carinatum carinis 5 maioribus 5 minoribus alternantibus.

Types: Brass 7981, holotype in L, isotype in A. *New Guinea.*

Erycibe bullata Ridl. ex Hoogl. sp. nov. — Ramuli dense stellato-hirsuti, glabrescentes, vetustiores subrimosi. *Folia* crassiuscule coriacea, bullata, oblonga, ovato-oblonga, vel obovato-oblonga, 18—25 × 7½—11 cm, 9—12-nervia; apice breviter acuminata, basi acuta ad obtusa, margine recurvata; supra densiuscule stellato-hirsuta, glabrescentia, costa, nervis, venatione impressis; subtus indumento subpersistenti, costa, nervis, venatione prominentibus, venatione minore indistincta. Petiolus 6—16 mm longus. *Inflorescentiae* axillares, paniculatae, 1—c. 15-florae, breves (usque ad 2 mm longae), axibus dense hirsutis, bracteis lanceolatis usque ad 3 mm longis, sessilibus. Pedicellus 3—4 mm longus, hirsutus, bracteolis 2 infra medium positis, usque ad 2½ mm longis. *Sepala* 1 & 2 late ovata, 2 × 2.2 mm, 4 & 5 transverse ovalia, 1.9 × 2.2 mm; 1 & 2 subrigide stellato-hirsuta pilis (2—)3—5-ramosis ramis subequalibus vel uno ramo longiori (ad 500 μ longo); 4 & 5 pilis versus apicem appressis ramis subequalibus (ad 350 μ longis). *Corolla* c. 8 mm longa, tubus c. 2 mm longus; area mesopetalina 3.5 × 1.8 mm, subsparsim stellato-hirsuta pilis 3—6-ramosis ramis subequalibus (ad 400 μ longis); lobuli 2.8 mm longi, basi 2 mm lati, tenues, venatione distincta, margine integra. *Stamina* 1 mm supra corollae basin inserta; filamentum 1 mm longum, basi 0.4 mm latum; anthera 1 mm longa, 0.5 mm lata, 0.3 mm crassa, apice acuta (0.3 mm sterilis), basi cordata. *Ovarium* cylindrico-obovoideum, 1.5 mm longum, 0.7 mm diametro, glabrum; stigma conicum, 0.5 mm altum, 0.8 mm diametro, rimis 5 distinctis. *Fructus* ellipsoideus, 20 × 12 mm, glaber.

Types: Hose 572, holotype in K; paratypes: *Beccari P.B. 651* (FI), *Haviland & Hose s.n.* (K), *Haviland & Hose 3708* (K), *Haviland & Hose 3730* (K). *Sarawak.*

Erycibe carrii Hoogl. sp. nov. — Frutex scandens, ramulis junioribus dense stellato-hirsutis, adultioribus glabrescentibus cortice rimis longitudinalibus fisso. *Folia* ovata, (2.7—)4.5—7 × (0.9—)1.6—3 cm, apice acuta vel subacuminata, basi obtusa vel rotundata, supra stellato-hirsuta, glabrescentia, subtus dense stellato-hirsuta, indumento subpersistente; petiolus 6—10 mm longus. *Inflorescentiae* axillares, paniculatae, c. 3—12-florae, 1—6 cm longae, stellato-hirsutae, bracteis minutis, caducis. *Flores* pedicello 2—4 mm longo bracteolis 2 vel 4 minutis, caducis. *Sepala* 2 exteriora ovalia, c. 2 × 1.6 mm, 2 interiora transverso-ovalia, c. 2—2.2 × 2.5—2.7 mm, extus stellato-hirsuta, intus glabra. *Corolla* c. 6.8 mm longa; areae mesopetalinae c. 3 × 1.8 mm, adpresso-hirsutae pilis praesertim 3—6-ramosis; lobuli c. 2.5 mm longi, 3 mm lati, margine undulato-crenulati. *Stamina* c. 0.5 mm supra corollae basin inserta, filamento c. 0.6 mm longo, basi 0.3 mm lato, crassiusculo, anthera c. 1.4 mm longa, 0.8 mm lata, 0.5 mm crassa, apice acuminata acumine sterili 0.5 mm longo, basi cordata. *Ovarium* ovoideum, c. 0.9 longum, 0.8 mm diam., glabrum paucis pilis stellatis prope apicem exceptis; stigma conicum c. 1 mm altum, 1.2 mm diam., radiatim 5-carinatum carinis paulum torsis.

Types: Carr 15000, holotype in L, isotype in BM; paratypes: *Carr 13583* (L), *Clemens 11056* (A). *New Guinea.*

Erycibe crassipes Ridl. ex Hoogl. sp. nov.

Forma **crassipes.** — Frutex scandens c. 3 m alta. Ramuli densiuscule stellato-hirsuti, mox glabrescentes, vetustiores distincte rimosi. *Folia* subcoriacea, oblonga ad lanceolato-oblonga, 16—37 × 6½—9 cm, c. 8—12(—15)-nervia; apice (obtusa ad) acuta, saepe acuminata, basi obtusa ad acuta, minute decurrentia; supra dense stellato-hirsuta, mox glabrescentia, costa perpaulo impressa, nervis minime prominentibus, venatione indistincta; subtus dense stellato-hirsuta, mox glabrescentia, nervis prominentibus, venatione minime prominenti ad obsoleta. Petiolus 8—15 mm longus. *Inflorescentiae* axillares, saepe in ramis defoliatis, condense paniculatae, (1—)3—c. 10-florae, breves, ramis densiuscule hirsutis. Pedicellus 1—3 mm longus, hirsutus. *Sepala* 1 & 2 ovalia ad orbicularia, 2.6—3 × 2.3—2.8 mm, 4 & 5 orbicularia ad transverse ovalia, 2.7—2.8 × 2.8—3.5 mm, sparsim stellato-hirsuta pilis 4—8-ramosis ramis subequalibus (ad 250 μ longis). *Corolla* c. 10½—11 mm longa, tubus 2—2.7 mm longus; area mesopetalina 3—4 × 1.5—2 mm, parte superiori (2 mm) densiuscule stellato-hirsuta pilis 4—9-ramosis ramis subequalibus (ad 200 μ longis); lobuli 4.3—6 mm longi, basi 2—3 mm lati, subtenues, venatione distincta, margine integra. *Stamina* 0.8—1.4 mm supra corollae basin inserta; filamentum 1—1.3 mm longum, basi 0.4—0.6 mm latum; anthera 1—1.2 mm longa, 0.5—0.7 mm lata, 0.4—0.5 mm crassa, apice late acuta, basi subcordata. *Ovarium* ellipsoideum, 1—1.5 mm longum, 0.9—1.8 mm diametro, glabrum; stigma conicum, 0.6—1 mm altum, 0.9—1.1 mm diametro, rimis 10 subdistinctis.

Types: Haviland 3116, holotype in K; paratypes: *Haviland 2265* (K), *Haviland & Hose 3725* (K). *Sarawak.*

Forma **glabra** Hoogl. f. nov. — Differt a f. *crassipedi* sepalis extus glabris.

Types: *Van Steenis 1212,* holotype in L, isotypes in BO, SING.. *Bunguran (Natuna Islands).*

Erycibe grandiflora Adelb. sp. nov. — Frutex scandens (?), ramulis junioribus subteretibus, c. 2½—3 mm crassis, dense stellato-tomentosis, ferrugineis, adultioribus tarde glabrescentibus cortice rimis minutis longitudinalibus fisso. *Folia* petiolata, petiolis teretibus vel subangulatis supra leviter sulcatis, 5—7 mm longis, tomentosis ut ramuli, laminis tenuiter coriaceis, ovatis vel oblongo-ovatis vel oblongis, apice breviter acuminatis acumine breviter triangulato- vel longiusculo-acuminatis, acumine angusto subcaudato, basi rotundatis vel minutissime subcordatis, 8—13 cm longis, 3—7 cm latis, junioribus utrinque tomentosis, adultioribus supra glabris, nitidis, subtus tomentosis ut ramuli, margine anguste revolutis, nervo mediano supra plano, anguste sulcato, subtus prominente, nervis lateralibus utrinque 5—7, curvatis, prope marginem arcuato-conjunctis, supra prominulis, subtus prominentibus, nervis minoribus supra vix conspicuis, subtus prominulis. *Inflorescentiae* axillares vel terminales, racemosae, 1½—3½ cm longae, tomentosae, floribus congestis, breviter pedicellatis, pedicellis 2—3½ mm longis, tomentosis, bracteis oblongis vel lanceolatis, acutis, 3½—5 mm longis, subtus tomentosis. Alabastra globosa, ferrugineo-tomentosa. *Sepala* orbicularia vel interiora late transverso-elliptica, 4½ mm longa, extus tomentosa, intus glabra, interiora marginibus lateralibus tenuioribus extus glabris, ciliatis. *Corolla* fasciis 5 mesopetalis oblongis, acutis, usque ad basin tubi corollae c. 9 mm longis, 2½ mm latis, carnosis, in parte superiore triangulari extus dense aureo-sericeis, lobulis ellipticis vel orbicularibus vel transverso-ellipticis, late rotundatis, marginibus subintegris vel leviter irregulariterque undulatis glabris, apice supra fasciam mesopetalam haud vel breviter connatis, lobulis c. 3½ mm longis, c. 4½ mm latis, subcarnosis. *Stamina* c. 1 mm supra corollae basin inserta, filamentis applanatis, c. ½—1 mm longis, glabris, antheris erectis, breviter sagittatis, acuminatis, c. 1¼ mm longis. *Ovarium* globosum, 1 mm altum, glabrum, stigmate brevissime truncato-conico basi margine undulato, apice radiatim 5-carinato carinis irregulariter papillosis. *Bacca* ellipsoidea apicem versus attenuata, c. 15 mm longa, 10—14 mm lata, glabra, in sicco nigra, in vivo probabiliter rubra, apice interdum reliquis stigmatis coronata.

Types: Cultivated in Hortus Bogoriensis under no *XVI. A. 2a,* holotype in L, isotypes in BO; paratypes: idem *XVI. A. 2* (B, BO, L), *Beccari P. P. 920* (FI), *Britton & Winder 71* (A, L), *Ledermann 10434* (L), *Meijer Drees 224* (BO), *Feuilletau de Bruyn 323* (L), *Womersley NGF 4362* (L). *New Guinea.*

Erycibe grandifolia Merr. ex Hoogl. sp. nov. — Frutex scandens, cauli usque ad 6 cm crasso. Ramuli dense stellato-hirsuti pilis rufis, glabrescentes, vetustiores lenticellis perpaucis. *Folia* crassa, subcoriacea, in siccitate purpurascentia, elliptico-oblonga ad oblonga, ovato-oblonga, vel obovato-oblonga, 7—23 × 3½—12½ cm, c. 7—10-nervia; apice obtusa, breviter acuminata, basi (acuta ad) obtusa ad rotundata, vulgo pauce cordata; supra glabra, costa impressa ad minute prominenti, nervis minute prominentibus, venatione minime prominente ad minime impressa; subtus dense stellato-hirsuta, mox glabrescentia, nervis minime prominentibus ad minute impressis, venatione distincte impressa; margine saepe minute recurvata. Petiolus 10—

22 mm longus. *Inflorescentiae* terminales, saepe foliis aliquot in parte basali, vel axillares, paniculatae, 20—c. 200-florae, 2—c. 20 cm longae, ramis dense stellato-hirsutis. Pedicellus 1—2½ mm longus, dense hirsutus. *Sepala* 1 & 2 late ovata, c. 1.6—2.5 × 1.5—2 mm, 4 & 5 transverse ovalia, 1.3—1.9 × 2.2—2.6 mm; densiuscule stellato-hirsuta, pilis (5—)7—11-ramosis ramis subequalibus (ad 250 μ longis). *Corolla* c. 6—7 mm longa, tubus c. 1½—2 mm longus; area mesopetalina c. 3.2—3.7 × 1.7—2 mm, dense stellato-hirsuta pilis 6—12-ramosis ramis subequalibus (ad 250 μ longis); lobuli 2—2.5 mm longi, basi 2.3—3 mm lati, subcrassi, venatione indistincta, margine integra. *Stamina* 0.5—0.9 mm supra corollae basin inserta; filamentum 0.5—0.7 mm longum, basi 0.3—0.5 mm latum; anthera 1.2 mm longa, 0.4—0.6 mm lata, 0.3—0.4 mm crassa, apice acuta, basi subcordata. *Ovarium* subcylindricum, 1 mm longum, 0.8—1.2 mm diametro, parte superiori (0.6 mm) breviter stellato-hirsutum, parte inferiori glabrum; stigma conicum, 0.5—0.7 mm altum, 0.7—0.8 mm diametro, rimis 10 minime distinctis. *Fructus* ellipsoideus, 20 × 14 mm, dense et breviter stellato-hirsutus.

Types: Elmer 21455, holotype in L, isotypes in A, B, BM, BO, C, G, K, MO, NY, P, SING, U, UC. *Borneo.*

Erycibe hollrungii Hoogl. sp. nov. — Frutex scandens, ramulis junioribus strigosis, adultioribus glabrescentibus cortice rimis longitudinalibus fisso. *Folia* ovato-oblonga, (6—)10—14 × (2.5—)4.5—6.5 cm, apice obtusa, saepe paulum acuminata, basi obtusa ad rotundata, supra sparsim strigosa, mox glabrescentia, subtus strigosa, mox glabrescentia; petiolus 5—12 mm longus. *Inflorescentiae* axillares vel subterminales, paniculatae, c. 25—75-florae, 3—10 cm longae, dense strigosae, bracteis minutis vel, perpaucis, foliaceis (usque ad 12 × 3.5 cm), caducis. *Flores* pedicello 1.5—4 mm longo sine bracteolis vel bracteolis minutis, caducis. *Sepala* 2 exteriora transverso-ovalia, c. 2.2 × 2.5 mm, 2 interiora transverso-elliptica, c. 2 × 3 mm, extus densiuscule strigosa, intus glabra. *Corolla* c. 7 mm longa; areae mesopetalinae c. 4 × 2 mm, densiuscule pilosa pilis praesertim 2-ramosis, ad 1.25 mm longis; lobuli c. 3 mm longi, 2.5—3 mm lati. *Stamina* c. 0.6 mm supra corollae basin inserta, filamento c. 0.8 mm longo, basi 0.4 mm lato, anthera c. 1.5 mm longa, 0.7 mm lata, 0.5 mm crassa, apice acuminata acumine sterili 0.2 mm longa, basi cordata. *Ovarium* ovoideum, c. 0.9 mm longum, 0.9 mm diam., parte inferiore (0.3 mm) glabrum, parte superiore dense stellato-hirsutum; stigmata conicum, c. 0.8 mm altum, 1 mm diam., radiatim 5-carinatum.

Types: Hollrung s. n., holotype in B, isotypes in B, BO, K, L, P. *New Guinea.*

Erycibe impressa Hoogl. sp. nov. — Frutex scandens, ad 45 m longus. Ramuli vetustiores distincte rimosi. *Folia* coriacea, elliptico-oblonga, 7—12 × 3—5 cm; apice obtusa ad late acuta, acuminata, basi obtusa; utrinque glabra; supra costa, nervis, venatione minute impressis; subtus nervis et venatione minute impressis. Petiolus 7—14 mm longus. *Flores* ignoti. Pedicellus sub fructu 6—10 mm longus. *Sepala* (in fructu) transverse ovalia, 4 × 5 mm, extus sparsim strigosa pilis 2-ramosis (ad 400 μ longis). *Fructus* ellipsoideus, 17 × 12 mm, glaber, parte inferiori laevis, parte superiori ($^1/_3$—$^2/_3$) squamulosus. Cotyledones simplices.

Types: Clemens 29099, holotype in L, isotypes in A, BM, BO, G, K. *British North Borneo.*

Erycibe kinabaluensis Hoogl. sp. nov. — Frutex scandens. Ramuli densiuscule strigoso-hirsuti, glabrescentes, vetustiores lenticellis submultis minutis ovalibus. *Folia* subcoriacea, oblonga, 4½—8½ × 1.8—2½ cm, c. 7—8-nervia; apice acuminata, basi acuta ad obtusa; supra glabra, costa minute impressa, nervis et venatione prominentibus; subtus glabra, parte basali costae subsparsim villosa, nervis et venatione prominentibus. Petiolus 5—9 mm longus. *Inflorescentiae* axillares, solitares vel binae vel ternae, paniculatae, (1—)3—20-florae, 3—40 mm longae, ramulis dense strigoso-hirsutis. Pedicellus 2—5 mm longus, dense hirsutis. *Sepala* transverse ovalia, 1 & 2 1.8 × 2.2 mm, 4 & 5 2 × 2.5—2.7 mm, extus dense hirsuta pilis 2-ramosis (raro ramo tertio minuto) (ad 900 μ longis), trunco basali distincto (ad 50 μ longo). *Corolla* c. 5.5 mm longa, tubus c. 0.8 mm longus; area mesopetalina 3.2 × 2 mm, dense hirsuta pilis (2—)3(—4)-ramosis ramis undulatis subequalibus vel inaequalibus (ad 700 μ longis), trunco basali distincto (ad 100 μ longo); lobuli c. 2.5 mm longi, basi 2 mm lati, subcrassi, venatione subdistincta, margine integra. *Stamina* c. 0.8 mm supra corollae basin inserta; filamentum 0.5 mm longum, basi et apicem versus 0.3 mm latum; anthera 1.2 mm longa, 0.9 mm lata, 0.7 mm crassa, apice acuta, minute truncata, basi subcordata. *Ovarium* cylindricum, 0.9 mm longum, 1 mm diametro, glabrum; stigma conicum, 0.9 mm altum, 1 mm diametro, rimis 5 subdistinctis.

Type specimen: Carr SF 27115, holotype in SING. *British North Borneo.*

Erycibe pedicellata Ridl. ex Hoogl. sp. nov. — Frutex scandens. Ramuli sparsim strigosi, mox glabrescentes, vetustiores distincte rimosi. *Folia* coriacea, oblonga, 6—12 × 2—4½ cm, c. 4—6-nervia, apice obtusa ad rotundata, saepe acuminata, basi obtusa; utrinque glabra parte basali costae sparsissime strigosa mox glabrescente excepta; supra costa minute impressa, nervis minime prominentibus, venatione subindistincta; subtus nervis minime prominentibus, venatione subindistincta. Petiolus 7—12 mm longus. *Inflorescentiae* axillares, breviter paniculatae (subfasciculatae), (1—)2—5-florae, ad 2½ cm longae, ramulis strigosis. Pedicellus 7—15 mm longus. *Sepala* subequalia, 1 & 2 late ovata, 4 & 5 transverse ovalia, omnia 2 × 2.5 mm, sparsim strigosa pilis 2-ramosis (ad 500 μ longis). *Corolla* c. 6 mm longa, tubus c. 2 mm longus; area mesopetalina 2.6 × 1.8 mm, densiuscule adpresse hirsuta pilis (2—)3(—4)-ramosis ramis subaequalibus vel inaequalibus (ad 450 μ longis); lobuli 2 mm longi, basi 1.3 mm lati, subcrassi, venatione indistincta, margine integra. *Stamina* 1.3 mm supra corollae basin inserta; filamentum 0.3 mm longum, basi 0.25 mm latum; anthera 0.5 mm longa, 0.8 mm lata, 0.4 mm crassa, apice et basi truncata, minute retusa. *Ovarium* ovoideum, 1.6 mm longum, 1 mm diametro, glabrum; stigma conicum, 0.5 mm altum, 0.9 mm diametro, rimis 5 subdistinctis.

Types: Beccari P. B. 3271, holotype in K, isotypes in FI, G, P. *Sarawak.*

Erycibe praecipua Prain, J. As. Soc. Beng. 63, II, 1894, 86.

Ssp. **borneensis** Hoogl. subsp. nov. — Differt a ssp. *praecipua foliis* majoribus, 10—15 × 4½—7½ cm (in ssp. *praecipua* (3—)5—11 × (1½—)2½—5 cm), 5—7-nervis (in ssp. *praecipua* 4—5-nervis); petiolo

9—15 mm longo (in ssp. *praecipua* 5—10 mm longo); *inflorescentiis* ad 5 cm longis (in ssp. *praecipua* ad 2 cm longis); pedicello 5—15 mm longo (in ssp. *praecipua* 2—5 mm).

Types: Clemens 50087, holotype in L, isotypes in A, BM, G, K, UC. *British North Borneo.*

Erycibe puberula Hoogl. sp. nov. — Frutex scandens, ramulis junioribus dense breviter stellato-hirsutis, adultioribus glabrescentibus cortice rimis longitudinalibus fisso. *Folia* elliptico-oblonga ad oblonga, 6—14 × 3—8 cm, apice obtusa vel breviter acuminata, basi obtusa, supra glabra, subtus intervenio glabra, nervis lateralibus puberula indumento caduco, nervo medio puberula indumento persistenti; petiolus 8—15 mm longus. *Inflorescentiae* axillares vel subterminales, paniculatae, c. (10—)25—80-florae, (2.5—)4—10 cm longae, dense stellato-hirsutae, bracteis minutis, caducis. *Flores* pedicello 1—4 mm longo bracteolis 2 vel 4 minutis, caducis. *Sepala* 2 exteriora orbicularia, c. 2.5 × 2.5 mm, 2 interiora transverso-ovalia, c. 2.2 × 2.7 mm, extus dense stellato-hirsuta, intus glabra. *Corolla* c. 6.2 mm longa; areae mesopetalinae c. 2.5 × 1.8 mm, stellato-hirsutae pilis 3—5-ramosis ramo basali ad 200 μ longo; lobuli c. 2 mm longi, 2.5—3 mm lati, margine crenulati. *Stamina* c. 0.5 mm supra corollae basin inserta, filamento c. 0.8 mm longo, basi 0.4 mm lato, anthera c. 1.2 mm longa, 0.7 mm lata, 0.4 mm crassa, apice acuminata acumine sterili 0.5 mm longa, basi cordata. *Ovarium* late ovoideum, c. 0.7 mm longum, 1.2 mm diam., parte inferiore glabrum, parte superiore stellato-hirsutum; stigma conicum, c. 0.7 mm altum, 1 mm diam., radiatim 5-carinatum.

Types: Meijer Drees 497, holotype and isotypes in BO; paratypes: *Brass 12803* (A, L). *New Guinea.*

Erycibe ramosii Hoogl. sp. nov. — Frutex scandens. Ramuli dense strigoso-hirsuti, glabrescentes, vetustiores rimis distinctis. *Folia* elliptico-oblonga ad oblonga, 5—10 × 1¾—4 cm, 7—10-nervia; apice obtusa ad acuta, breviter ad longe acuminata, basi obtusa ad acuta; supra dense strigoso-hirsuta, mox glabrescentia, costa minute impressa, nervis et venatione minute prominentibus; subtus dense strigoso-hirsuta, mox glabrescentia, nervis et venatione robustiori minute prominentibus, venatione graciliori minime prominente ad indistincta. Petiolus 10—16 mm longus. *Inflorescentiae* terminales vel axillares, paniculatae, 10—60-florae, 2—6 cm longae, ramulis dense strigoso-hirsutis. Pedicellus 2—3 mm longus. Sepala 1 & 2 orbicularia, 2.3 × 2.3 mm, 4 & 5 transverse ovalia, 2.2 × 3 mm, densiuscule appresso-hirsuta pilis 2-ramosis (ad 400 μ longis). *Corolla* 7½ mm longa, tubus 2 mm longus; area mesopetalina 3.5 × 2.1 mm, densiuscule appresso-pilosa pilis 2-ramosis (ad 700 μ longis); lobuli 2.5 mm longi, basi 1.5 mm lati, subcrassi, venatione obsoleta, margine minute undulata. *Stamina* 1.2 mm supra corollae basin inserta; filamentum 1 mm longum, basi 0.6 mm latum; anthera 1.2 mm longa, 0.7 mm lata, 0.4 mm crassa, apice acuta, basi cordata. *Ovarium* 1.4 mm longum, 1.5 mm diametro, adpresse hirsutum; stigma conicum, 0.7 mm altum, 1.2 mm diametro, rimis 5 subdistinctis. *Fructus* ellipsoideus, 20 × 12 mm, pilis paucis in apice exceptis, glaber laevis. Cotyledones simplices.

Types: Ramos BS 15096, holotype in K; paratypes: *Alvarez FB 12973* (K), *Mabesa FB 26910* (A, BM, K, NY, P), *Wenzel 1100* (A, BM, G). *Philippines.*

Erycibe sericea Hoogl. sp. nov. — Frutex scandens. Ramuli densiuscule sericei, glabrescentes, vetustiores lenticellis rotundis vel ovalibus. *Folia* oblonga vel ovato-oblonga, 8—10½ × 3½—5 cm, 6—8-nervia; apice obtusa, breviter acuminata, basi obtusa ad rotundata; supra glabra, costa impressa, nervis minime prominentibus, venatione subindistincta; subtus dense sericea, nervis prominentibus, venatione minute prominente. Petiolus c. 10 mm longus. *Inflorescentiae* axillares, breviter paniculatae, c. 6—10-florae, 5—10 mm longae, ramulis dense strigosis. Pedicellus 2—3 mm longus. *Sepala* 1 & 2 orbicularia vel late ovata, 2.4 × 2.6 mm, 4 & 5 transverse ovalia, apice minute incisa, 2.4 × 3.5 mm, densiuscule strigosa pilis 2-ramosis (ad 250 μ longis). *Corolla* 10½ mm longa, tubus 2 mm longus; area mesopetalina 6.5 × 3 mm, dense adpresso-pilosa pilis 2-ramosis (ad 500 μ longis); lobuli 5 mm longi, basi 4—4.5 mm lati, subcrassi, venatione minime distincta, margine integri. *Stamina* 1.2 mm supra corollae basin inserta; filamentum 0.7 mm longum, basi 0.3 mm latum; anthera 1.8 mm longa, 0.7 mm lata, 0.5 mm crassa, apice acuta, basi subcordata. *Ovarium* late cylindricum, 0.9 mm altum, 1.6 mm diametro, densiuscule hirsutum; stigma conicum, 0.75 mm altum, 1.3 mm diametro, rimis 10 subdistinctis.

Type: Vidal 3361, holotype in K. *Malamaui Island (Philippines).*

Erycibe stenophylla Hoogl. sp. nov. — Frutex scandens. Ramuli sparsim stellato-hirsuti, mox glabrescentes, vetustiores rimosi. *Folia* subcoriacea, lineari-lanceolata, subfalcata, 7—12 × 0.7—1.3 cm, c. 6—8-nervia; apice longe acuminata, basi acuta; supra glabra, costa et nervis minute, venatione minime prominentibus; subtus subsparsim stellato-hirsuta, mox glabrescentia, nervis minute prominentibus, venatione minime prominente. Petiolus 4—7 mm longus. *Inflorescentiae* axillares vel terminales, paniculatae, (1—)2—3(—4)-florae, ad 1 cm longae, ramulis densiuscule stellato-hirsutis. Pedicellus 1—2 mm longus. *Sepala* 1 & 2 ovalia, 2.4—3 × 2—2.2 mm, 4 & 5 transverse ovalia, 2.3—2.5 × 3.4—3.5 mm, apice distincte retusa, sparsim stellato-hirsuta pilis 3—5-ramosis ramis subequalibus (ad 200 μ longis). *Corolla* 8—9 mm longa, tubus 2.2—2.5 mm longus; area mesopetalina 3—3.2 × 1.7—1.8 mm, densiuscule stellato-hirsuta pilis 5—7-ramosis ramo uno longiori (ad 350 μ longo); lobuli 3—3.5 mm longi, basi 2—2.5 mm lati, subtenues, venatione subdistincta, margine integri. *Stamina* 0.7 mm supra corollae basin inserta; filamentum 0.6 mm longum, basi 0.7 mm latum; anthera 1 mm longa, 0.7 mm lata, 0.5 mm crassa, apice subobtusa, basi subcordata. *Ovarium* cylindricum, 1.2 mm longum, 0.7 mm diametro, glabrum; stigma conicum, 0.4 mm altum, 1 mm diametro, rimis 5 distinctis.

Types: Beccari P.B. 2832, holotype in FI, isotypes in FI, G, K, L. *Sarawak.*

Erycibe subglabra Scheff. ex Hoogl. sp. nov. — Frutex scandens. Ramuli densiuscule stellato-hirsuti, mox glabrescentes, vetustiores rimis distinctis. *Folia* elliptica ad oblonga, 6—13 × 2½—6½ cm, c. 5—7-nervia; apice obtusa ad acuta, saepe minute acuminata, basi obtusa ad rotundata vel minute cordata; utrinque glabra; supra costa minute impressa, nervis et venatione minute prominentibus, subtus nervis et venatione distincte prominentibus. Petiolus 6—12 mm longus. *Inflorescentiae* axillares, saepe in ramis defoliatis, solitariae vel binae vel ternae, paniculatae, 5—50-florae, 1½—6 cm longae, ramulis densiuscule ad dense stellato-hirsutis. Pedicellus 2—4 mm longus. *Sepala* 1 & 2 orbicularia ad transverse ovalia, 3—3.5 × 3—4 mm, 4 & 5 transverse ovalia, 3—3.2 × 4—4.2 mm, subsparsim ad densiuscule stellato-hirsuta pilis 3—8-ramosis ramis subequalibus ad 500 μ longis. *Corolla* 8 mm longa, tubus 2—3 mm longus; area mesopetalina 2.8—3.5 × 2.5 mm, dense adpresso-pilosa pilis (2—)3—6(—9)-ramosis plerumque uno ramo majore (ad 1000 μ longo); lobuli 3—3.5 mm longi, basi 3 mm lati, subcrassi, venatione indistincta, margine minime crenulati. *Stamina* 0.8—1.3 mm supra corollae basin inserta; filamentum 0.7—1 mm longum, basi 0.8 mm latum; anthera 1.9—2 mm longa, 0.8—1 mm lata, 0.5—0.6 mm crassa, apice acuminata acumine sterili 0.5—0.6 mm longo, basi cordata. *Ovarium* ellipsoideum, 1.2 mm longum, 1.7—2.2 mm diametro, in parte superiore adpresso-pilosum; stigma conicum, 0.7—1 mm altum, 1.4—1.7 mm diametro, rimis 5 distinctis et 5 minutis. *Fructus* ellipsoideus, 1.7 × 1.1 mm, pilis nonnullis in apice extremo exceptis, glaber laevis. Cotyledones simplices.

Types: Kornassi 226, holotype in L, isotypes in BO, U; paratypes: *Warburg 17300* (B); cultivated in Hortus Bogoriensis, from Amboina (BO, L, MICH). *Moluccas.*

Erycibe subsericea Hoogl. sp. nov. — Frutex scandens. Ramuli dense breviter sericei, glabrescentes, vetustiores subteretes lenticellis submultis orbicularibus. *Folia* coriacea, ovata ad elliptica, 9—15 × 5½—9 cm, c. 5—7-nervata; apice obtusa, breviter acuminata, basi obtusa; supra dense breviter sericea, mox glabrescentia, costa et nervis minute impressis, venatione minime impressa ad indistincta; subtus dense breviter sericea, indumento subtarde caduca, nervis minute prominentibus, venatione minute ad minime prominente. Petiolus 15—25 mm longus. *Inflorescentiae* axillares, versus apicem ramulorum terminales, 10—80-florae, (2½—)4—25 cm longae, ramulis dense sericeis. Pedicellus 2—3 mm longus, dense sericeus. *Sepala* 1 & 2 late ovata, 4.3 × 3.8 mm, 4 & 5 transverse ovalia, 3.4 × 4.2 mm, extus subdense strigosa pilis 2-ramosis (ad 250 μ longis). *Corolla* c. 9 mm longa, tubus c. 3 mm longus; area mesopetalina 5 × 2.8 mm, dense strigosa pilis 2-ramosis (ad 900 μ longis); lobuli 3—3.5 mm longi, basi 1.8—2 mm lati, subcrassi, venatione indistincta, margine subcrenati. *Stamina* c. 1.4 mm supra corollae basin inserta; filamentum 0.5 mm longum, basi 0.4 mm latum; anthera 1.8 mm longa, 0.9 mm lata, 0.7 mm crassa, apice acuta, basi subcordata. *Ovarium* ovoideum, 1.7 mm longum, 1.3 mm diametro, subdense strigosum; stigma conicum, 1.2 mm altum, 1 mm diametro, rimis 5 distinctis.

Types: Kostermans 5116, holotype in BO, isotypes to be distributed to Canberra, K, L. *East Borneo.*

Erycibe timorensis Hallier f. ex Hoogl. sp. nov. — Frutex scandens. Ramuli dense stellato-hirsuti, glabrescentes, vetustiores rimis distinctis. *Folia* elliptico-oblonga ad oblonga vel ovato-oblonga, 4—10½ × 1.8—3.6 mm, c. 6—8-nervia; apice obtusa ad acuta, acuminata acumine c. 1½ cm longo, basi obtusa ad rotundata; supra dense stellato-hirsuta, mox glabrescentia, costa minute impressa, nervis et venatione minime ad distincte prominentibus; subtus dense stellato-hirsuta, glabrescentia (indumento subpersistente secus costam), nervis et venatione prominentibus. Petiolus 5—7 mm longus. *Inflorescentiae* axillares, paniculatae, 5—25-florae, 2—12 cm longae, ramulis dense stellato-hirsutis. Pedicellus 1—2 mm longus. *Sepala* transverse ovalia, 1 & 2 2—2.3 × 2.4—2.5 mm, 4 & 5 1.9—2 × 2.3 mm, dense stellato-hirsuta pilis 4—7-ramosis ramis subequalibus (ad 250 μ longis). *Corolla* 6½ mm longa, tubus 2 mm longus; area mesopetalina 3.5 × 2 mm, densiuscule adpresso-pilosa pilis 4—6-ramosis ramis subequalibus vel uno ramo longiore (ad 550 μ longo); lobuli 2.5 mm longi, basi 2.7 mm lati, subtenues venatione subdistincta, margine subcrenulato, supra aream mesopetalinam longitudine 0.8 mm coherentes. *Stamina* 0.6 mm supra corollae basin inserta; filamentum 1.2 mm longum, basi 0.4 mm latum; anthera 1 mm longa, 0.5 mm lata, 0.4 mm crassa, apice acuta, basi subcordata. *Ovarium* ovoideum, 1.2 mm longum, 0.9 mm diametro, parte inferiore glabrum (0.8 mm), parte superiore stellato-hirsutum; stigma conicum, 0.7 mm altum, 1 mm diametro, rimis 10 distinctis.

Types: Spanoghe 43, holotype in L, isotype in P; paratypes: *Zippelius s.n.* (L), *Zippelius 43* (L). *Timor.*

Erycibe zippelii Hoogl. sp. nov. — Frutex scandens, ramulis junioribus densiuscule stellato-hirsutis, adultioribus glabrescentibus cortice rimis longitudinalibus fisso. *Folia* elliptico-oblonga, c. 6—8.5 × 3—4.5 cm, apice rotundata, breviter acuminata, basi obtusa, supra glabra, in juventute probabiliter hirsuta, subtus minute stellato-hirsuta, mox glabrescentia; petiolus 6—10 mm longus. *Inflorescentiae* axillares, paniculatae, pauciflorae, usque ad c. 6 cm longae, dense stellato-hirsutae. *Flores* ignotae; pedicellus fructifer c. 4—6 mm longus. *Sepala* fructus transverso-ovalia, 2 exteriora c. 2.5 × 3.2 mm, 2 interiora c. 2.3—2.5 × 3.3—3.7 mm, extus stellato-hirsuta, intus glabra. *Fructus*, probabiliter immaturus, ovoideus, c. 7 × 5 mm, glaber parte apicali stellato-hirsuta excepta.

Types: Zippelius 131, holotype in L; paratype: *Zippelius 110* (L). *New Guinea.*

FLORAE MALESIANAE PRECURSORES III
DIALIUM L. (CAESALPINIACEAE)

by

H. C. D. DE WIT
(Flora Malesiana, Leiden)

(Issued 18. XII. 1953)

Dialium hydnocarpoides, sp. nov. — Foliola (15)17—19, elliptice oblonga, 4.5—6.5(8.5) cm longa, 2—2.5(3) cm lata, apice abrupte breviter acuminata. Sepala extus pubescentia, intus puberula. Stamina 2, raro 3. Ovarium in receptaculo plano, lato, strigoso excentrice insertum. Stylus glaber. Legumen fere globosum, leave, velutinum, c. 15 mm diam.

Typus — Sumatra, Palembang, prope Lematang Ilir: *FRI 185 T. 3 P. 541* (L). Specimina paratypica: Sumatra, Lematang Ilir: *FRI T. 540.* Borneo: *FRI T. 1028; Endert 99; NIFS bb. 12964, 14634, 14655, 24764.*

Species ex affinitate *D. kingii* Prain, differt tamen foliolis plurimis, sepalis interne sine area velutina basali, flore et fructu minoribus.

Dialium laurinum Baker var. **bursa,** var. nov. — Foliola (5—)7, elliptica, vel elliptice oblonga, nitentia. Sepala alba lanato-pubescentia. Ovarium leviter excentrice in receptaculo angusto, fere obsoleto, albo-sericeum insertum. Stylus pro parte maiore albo-pubescens. Legumen conspicue compressum, 30—35 mm longum, fere 25 mm latum, c. 16—18 mm diam.. viride-griseum, velutinum, apicem versus valde latior, rotundato-truncatum, bursae instar.

Typus — Sumatra, Palembang, Banjuasin & Kubu Lands, prope Bajung Lintjir: *FRI 186 T. 1 P. 197* (L).

Dialium marginatum, sp. nov. — Foliola 5, chartacea, ovata vel ovato-oblonga, (9)12—18 cm longa, 5.5—7.5 cm lata; apice graciliter longe acuminata vel caudata. Sepala ovata, extus subglabra vel delicate sparse puberula tamen margine dense pubescentia. Filamenta staminorum latissima, minus quam 1 mm longa, 1.25 mm lata. Ovarium subsessile, in receptaculo parvo glabro insertum, viride-olivaceo-sericeum, in stylum longum abrupte contractum, glabrum. Legumen ignotum.

Typus — Borneo, Sarawak: *Beccari, Piante bornensi 3381* (K).

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1) FRI: Forest Research Station, Bogor (Buitenzorg), Java.
NIFS: Neth. Indies Forestry Service.

Dialium praetermissum, sp. nov. — Foliola 9—11, subcoriacea, elliptica vel elliptice-oblonga, basi late rotundata, apice late rotundata, tamen abrupte breviter acuminata. Sepala extus dense puberula, intus glabra. Ovarium in medio receptaculi lati, plani, pubescentis insertum, aureo-velutinum; stylus glaber, gracilis. Legumen ignotum.

Typus — Borneo, SE. Division, Tandjung, prope Pangelak: *NIFS bb. 13951* (BO).

Dialium silvestre, sp. nov. — Ramuli longitudinaliter rugosi, decorticantes. Foliola 5, valde coriacea, ovata vel ovato-oblonga, 6—10 cm longa, 3—3.5(4) cm lata, supra nitidissima, statu sicco flavescentia vel olivaceo-grisea, glabra, apice graciliter acuminata vel caudata. Sepala utrimque pubescentia, membranacea. Ovarium subsessile, fere in centro receptaculi insertum, breviter strigosum, flavo-viride, in stylum usque ad ultra dimidiam glabrum abrupte contractum. Legumen brunneum, puberulum, rugosulum, obovoideum, ad insertionem leviter angulatum, leviter compressum, c. 2 cm longum, c. 1.5 cm diam

Typus — Borneo: *NIFS bb. 12957* (BO).
Specimina paratypica: *NIFS bb. 10031, 11549, 16037, 16786.*

Dialium trifoliolatum, sp. nov. — Foliola 3(—1), coriacea, ovata vel ovato-oblonga, 8—16 cm longa, 3.5—4(5) cm lata, glabra, apice acuminata vel subcaudata. Ovarium breviter strigosum, basin versus gradatim angustatum, subsessile; receptaculum angustum, breviter strigosum. Legumen ovoideum, compressum, ad apicem angustatum vel subumbonatum, 4 cm longum, 2.75 cm latum, 18 mm in diam., mox glabrum.

Typus — Borneo: *NIFS bb. 19826* (BO).
Specimina paratypica: *Hallier 2418. NIFS bb. 10781, 11886, 13059, 13856, 13934, 15225, 19826, 19999, 20671.*

Dialium triste, sp. nov. — Foliola 9—11, coriacea, elliptice-oblonga, 12—17 cm longa, 3—4.5 cm lata, subtus brunnea, lanato-pubescentia, nervi laterales ascendentes et alte prominentes, apice rotundata tamen abrupte breviter acuminata. Legumen brunneum, velutinum, laeve, ovoideum, leviter compressum, 2—2.5 cm longum, 1.5 cm latum.

Typus — Borneo, Sarawak: *Daud et Tachun, Singapore Field Herb. No 35743* (SING).

Dialium turbinatum, sp. nov. — Foliola 7, ovato-oblonga, 8—9 cm longa, 2.5—3.75 cm lata, sparsissime fugaciter pubescentia, apice vix acuminata. Sepala subcoriacea, extus dense breviter velutina, intus minute sparse puberula. Ovarium in centro receptaculi magni, plano-turbinati, strigosi insertum (alabastrum turbinatum, basi angulatum).

Typus — Borneo, Tambunan, prope Kampung Tambata: *Forest Dept Herbarium, Br. North Borneo No 3784* (K).

FLORAE MALESIANAE PRECURSORES IV.
NEW SPECIES OF TERMINALIA FROM MALAYSIA

by

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(Issued 18. XII. 1953)

The following new species of *Terminalia* will be included in the forthcoming account of the Combretaceae for the Flora Malesiana where their respective positions in the key will indicate more clearly their relationship to already described species.

Terminalia capitulata Exell, sp. nov.

Arbor 17 m alta, ramulis dense rufo-sericeo-pilosis. *Folia* spiraliter ordinata ad apices ramulorum conferta, petiolata, petiolo 3—7 mm longo rufo-sericeo, lamina subcoriacea obovata, usque 4.5 × 2.6 cm, omnino primo dense demum sparse rufo-sericeo-pilosa, supra conspicue subtus vix conspicue minute verruculosa, apice plerumque rotundata basi cuneata vel nonnunquam rotundata, costis lateralibus utrinsecus 5—7 domatiis in axillis instructis. *Flores* albi sessiles in pseudo-capitulis 3—6-floris longe et graciliter pedunculatis, pedunculo ad 4 cm longo rufo-sericeo apice bracteato, bracteis 2—3 mm longis dispositi. *Receptaculum* inferius 1.5—2 mm longum rufo-sericeum, superius obsoletum. *Calycis lobi* triangulares vel ovato-triangulares acuti, 2 mm longi, apice recurvati extus rufo-sericei intus glabri. *Stamina* 10, filamentis 2 mm longis glabris, antheris 0.3 mm longis. *Discus* barbatus. *Stylus* 2 mm longus glaber. *Fructus* ignotus.

NETHERLANDS NEW GUINEA. Balim River, alt. 1600 m, in relic strip of forest on bank of river, Dec. 1938: *Brass & Versteegh 11173* (A, *type;* BM; L). "Tree 17 m high, 120 cm diam.; crown wide-spreading; bark 7 mm thick, black, scaly, rough; flowers white".

The rhachis of the inflorescence is extremely abbreviated so that the flowers appear to be in long-stalked capitulae. The indumentum is reddish and silky in the dried specimens but it is possible that the red colour appears only on drying as often happens in this type of indumentum.

The nearest relative seems to be *T. archboldiana* Exell from Papua which is similar in appearance but with less congested inflorescences and shorter petioles.

Terminalia kjellbergii Exell, sp. nov.

Arbor 15 m alta, ramulis crassiusculis apicem versus 4- vel 5-angulatis nonnumquam fere alatis primo fulvo-sericeis mox glabrescentibus. *Folia*

coriacea spiraliter ordinata ad apices ramulorum conferta breviter petiolata, petiolo crasso 3—5 mm longo primo fulvo-tomentoso mox glabrescente, lamina obovato-elliptica vel anguste elliptica, 5—15 × 2—6.5 cm, apice obtusa vel rotundata basi rotundata vel subcordata biglandulosa, juventute sparse sericeo-pilosa mox omnino glabra nitidula supra minute verruculosa, costa media utrinque prominula, costis lateralibus utrinsecus 11—12. *Flores* sessiles in spicas axillaribus ad 17 cm longis, rhachide crassiusculo minute appresse pubescente, bracteolis filiformibus 1.5 mm longis, dispositi. *Receptaculum* inferius 3.5—4 mm longum fulvo-sericeum, superius cupuliforme, 3—3.5 × 5—5.5 mm, extus viscidum fere glabrum intus sericeo-pilosulum. *Calycis lobi* ovato-acuminati 3 mm longi glabri. *Stamina* 10, filamentis 12—13 mm longis glabris, antheris 1 mm longis. *Discus* fere glaber. *Stylus* 11 mm longus glaber. *Fructus* vide infra.

Central Celebes. Lake Towuti, shores of the lake, in a swamp, alt. 300 m, 30 Aug. 1929: *Kjellberg 2212* (BO, *type*). "Baum bis 15 m hoch; Kelch aussen rötlich; Frucht geplattet".

In order to avoid possible future confusion I have drawn up the description entirely from *Kjellberg 2212.* I did not see any fruit with this specimen. A fruiting specimen, also from Central Celebes (Malili, Tapukulemo, ± 400 m alt., *NIFS bb. 24487* (A; BO) seems to be conspecific and from it the following further details are added: *Folia* ad 20 × 7.5 cm. *Fructus* ambitu ovatus, 2.5 × 1.7 cm, bialatus, alis 5 mm latis, glaber.

This species resembles *T. supitiana* Koord. in appearance but differs in the sericeous lower receptacle, the almost glabrous disk, rare in this genus, and the much smaller fruits.

The branchlets show typical sympodial growth, first elongating (for some 20—30 cm in *Kjellberg 2212*) and then producing a crowded tuft of leaves with inflorescences in their axils. One or two side shoots arise in the axils of these leaves, continue the vegetative growth and produce in their turn further tufts of leaves and inflorescences.

Terminalia slooteniana Exell, sp. nov.

Arbor 25 m alta, ramulis crassis glabris. *Folia* coriacea spiraliter ordinata ad apices ramulorum conferta petiolata, petiolo 1—2 cm longo glabro apice (nonnunquam inconspicue) biglanduloso, lamina spathulata oblanceolata vel anguste obovato-elliptica, 10—20 × 4—8 cm, omnino glabra supra nitidula supra subtusque minute verruculosa conspicue reticulata, apice rotundata basi anguste cuneata in petiolum decurrente, costis lateralibus utrinsecus 9—12. *Flores* ignoti. *Fructus* viridis valde distinctus cheloniformis ambitu suborbicularis, 7.5 × 6—6.5 × 3 cm, anguste circumalatus.

Netherlands New Guinea. W. Rauna, 4 Apr. 1937: *Salverda 558 = NIFS bb. 22544* (BO, *type*); Fakfak, Agonda, in primary forest, *Lundquist 263 = NIFS bb. 32982* (BO).

This species has the same kind of sympodial growth described above under *T. kjellbergii.*

The affinity seems to be with *T. supitiana* Koord. The fruits are very remarkable having a comical resemblance to diminutive tortoises.

I have pleasure in naming this interesting species after the late Dr. D. F. van Slooten who first recognised it as new.

Terminalia clemensae Exell, sp. nov.

Arbor. Folia coriacea petiolata, petiolo 1.5—2 cm longo glabro, lamina elliptica apice rotundata vel breviter acuminata basi cuneata, 20 × 8 cm, supra nitidula omnino glabra, costis lateralibus utrinsecus 12—14. *Flores* ignoti. *Fructus* valde lignosus complanato-ovoideo-ellipsoideus vel complanato-ellipsoideus, 6—7 × 3—4 × 1.5—1.8 cm, primo verisimiliter appresse-pubescens demum glaber anguste circumalatus, ala rigida 4 mm lata.

British New Guinea. Morobe, Quembung, 650—950 m, 14 May 1936: *Clemens 3087* (A, *type*).

This species is related to *T. supitiana* Koord. and *T. slooteniana* Exell both of which have circumalate fruits. *T. clemensae* is distinguished by its large flattened-ellipsoid fruit surrounded by a narrow, stiff wing.

Terminalia macadamii Exell, sp. nov.

Arbor alta, ramulis primo rufo-tomentellis demum glabrescentibus. *Folia* spiraliter ordinata petiolata, petiolo 1—3 cm longo rufo-tomentello, lamina chartacea elliptica vel late elliptica vel obovato-elliptica apice basique paullo acuminata, ad 18 × 9 cm, supra fere glabra subinconspicue minute verruculosa, pellucido-punctata, subtus praecipue ad nervos rufo-tomentella, costis lateralibus utrinsecus 9—12. *Flores* ignoti. *Fructus* oblongo-ellipsoideus, 2.5—3.5 × 1.3—1.5 cm, nonnunquam anguste circumjugosus nonnunquam paullo tetragonus, primo tomentellus demum glabrescens.

British New Guinea. Papua: Eastern District, Milne Bay, 28 Feb. 1944: *McAdam 8* (BRI, *type*). "Large tree, 8 ft girth, 60 ft to first limb and 120 ft overall with rusty brown crown. Roots keel out below 3 ft, hardly spurs. Green bole is longitudinally lined with rows of lenticels. Bark green longitudinally lined with rows of slightly raised lenticels, ½—¾ inch thick. Outside layer brittle and on chipping up exposes surface of deep red meat colour with lighter lines marking lenticels. Blaze is distinctive yellow, radial lines under lenticels separated by red areas which pale to cream at inner edge. Wood is creamy, porous". Vernacular name: Muru muru widi.

Most of the New Guinea species with a rufous tomentum on the lower surface of the leaf have laterally compressed fruits. Those of *T. macadamii* are, however, olive-shaped and scarcely compressed, though they occasionally have a narrow rim or ridge surrounding them. In cross-section the endocarp (stone) shows a considerable band of sclerenchymatous tissue extended radially in spoke-like projections. Before drying the outer layer was probably fleshy but considerably fibrous.

Terminalia molii Exell, sp. nov.

Arbor 30 m alta, ramulis primo rufo- vel fulvo-tomentellis mox glabrescentibus. *Folia* spiraliter ordinata petiolata, petiolo 8—15 mm longo puberulo apicem versus biglanduloso, lamina subcoriacea opaca obovato-elliptica, 2.5—7 × 1.5—3.2 cm, supra ad nervos sparse puberula, apice rotundata basi subrotundata vel subcuneata, costis lateralibus utrinsecus 5—6, domatiis glabris instructis. *Flores* ignoti. *Fructus* subglobosus, 3.5 × 3 cm, nitidus glaber suberosus.

Sumatra. Riouw and Dependencies, Indragiri Upland, ± 8 m alt., 25 Oct. 1938: *Mol 207* (BO, *type*); Tapanuli, Sibolga and vicinity, sea-level, 1 Dec. 1939: *De Haan 914* (BO), *915* (BO); Priaman: ex *Heyne* s.n. (BO).

This is probably related to *T. foetidissima* Griff. but it has smaller leaves and fruits.

The fruit, when dried, is light and corky showing in cross-section only a narrow band of sclerenchymatous tissue around the loculus.

Terminalia celebica Exell, sp. nov.

Arbor 20 m alta, ramulis glabris. *Folia* spiraliter ordinata ad apices ramulorum plus minusve congesta petiolata, petiolo 1.5—3 cm longo glabro, lamina chartacea elliptica vel anguste elliptica, 7—15 × 3.5—7 cm, apice acuminata basi anguste cuneata, omnino glabra, supra densissime minute verruculosa obscure pellucido-punctata vel opaca, costis lateralibus utrinsecus 9—12, domatiis vix conspicuis glabris. *Flores* flavidi in spicas axillares 6—13 cm longas uniti, rhachide fulvo-tomentello, bracteolis primo conspicuis filiformibus 3—9 mm longis recurvatis mox caducis; ♂ numerosissimi stipitati, stipite 1.5—3 mm longo appresse pubescente, ad apices spicarum dispositi; ⚥ pauciores sessiles basilari. *Receptaculum* inferius 2—2.5 mm longum apice angustatum dense sericeum, superius late cupuliforme, 1 × 2 mm, sparse pubescens vel fere glabrum. *Calycis lobi* triangulares, 2 × 1.2 mm, fere glabri. *Stamina* 10 exserta, filamentis glabris 4—5 mm longis, antheris 0.5 mm longis. *Discus* barbatus. *Stylus* 4 mm longus glaber. *Fructus* oblongo-ellipsoideus paullo lateraliter compressus, in sicco 4—4.5 × 1.8—2 × 1.4—1.6 cm glaber, apice apiculatus.

Central Celebes. Malili, in primary forest, alt. 250 m, 17 Sept. 1932: *Waturandang 26* (BO), 14 Mar. 1933, *Waturandang 324* (BO, *type*), 28 Mar. 1933, *Waturandang 333* (BO). Vernacular name: Tolike puteh.

The fruit shows in cross-section a band of sclerenchymatous tissue 3—4 mm thick enclosing in it some isolated air-chambers, especially in a narrow ring round the loculus. The sclerenchyma is extended radially into 9—10 spoke-like projections between them. As far as can be seen from examination of dried fruits of various species such air-chambers start as masses of foveolate tissue, more or less irregular in shape. This seems to break down, at least in some species, leaving empty spaces; so that whether such structures are described as foveolate tissue or air-chambers may depend on the age of the fruit. The structure here described is much the same as in *T. solomonensis* Exell but the fruit of *T. celebica* is larger and somewhat more compressed. The buds of the male flowers are also much more pointed in *T. celebica*. When more material is available it may be possible to make some sort of synthesis of the species of this affinity (*T. celebica, T. kangeanensis, T. papuana* and *T. solomonensis*) but at present the only satisfactory course seems to be to describe the plants from the various islands as different taxa.

Terminalia beccarii Exell, sp. nov.

Arbor, ramulis juventute sparse appresse pubescentibus mox glabrescentibus. *Folia* spiraliter ordinata petiolata, petiolo sparse appresse pubescente vel fere glabro, 2—4 cm longo, lamina chartacea elliptica vel obovato-elliptica, 7—14 × 4—7.5 cm, vix conspicue verruculosa opaca, ad nervos sparse appresse pubescente ceteroque glabra, apice acuminata basi obtusa, costis lateralibus utrinsecus 8—9 supra paullo impressis subtus prominulis, glandulis duobus basin versus instructa. Flores ♂ delapsi stipitati glabri, ♀ sessiles in spicas axillares ad 17—18 cm longas dispositi, rhachide glabro vel fere glabro, bracteolis nullis vel delapsis. *Receptaculum* inferius 2 mm longum glabrum, superius fere nullum. *Calycis lobi* ovati acuti, 2 × 1.5 mm extus glabri intus pilosi apice recurvati. *Stamina* 10, filamentis glabris 4 mm longis, antheris 0.5 mm longis. *Discus* barbatus. *Fructus* ignotus.

NETHERLANDS NEW GUINEA. Mt. Arfak, Putat, Oct. 1872: *Beccari 819* (FI, *type*).

This species differs from *T. papuana* Exell and *T. solomonensis* Exell by the long almost glabrous spikes and glabrous lower receptacle. The flowers are very similar to those of *T. nitens* Presl, but the latter species has shorter inflorescences and more distinctly obovate leaves with shorter petioles.

The two glands near the base of the lamina are rather peculiar as each extends for 2—3 mm either along or in the direction of a lateral nerve. They differ somewhat both from the petiolar glands and the domatia commonly found in the genus.

To what extent these 'glands' and the structures called 'domatia' are produced "naturally" by the plant or to what extent their formation or structure is due to insect stimuli would be an interesting study; but no light can be thrown on the problem by examination of dried specimens.

In *T. beccarii* the two glands near the base of the midrib are the most conspicuous and the most constantly developed but others, less well-developed, sometimes occur further up the midrib. Their development is accompanied by some disturbance of the general pattern of the secondary veins and the tertiary reticulation. In *Terminalia* it is not easy to divide the series extrafloral nectary — domatium — gall into clear-cut categories or to decide what is, or is not, pathological or even to decide the exact meaning of 'pathological' when structures are formed by a complicated interaction of insect and plant.

Terminalia lundquistii Exell, sp. nov.

Arbor 21 m alta, ramulis crassiusculis primo rufo-sericeus demum glabrescentibus. *Folia* spiraliter ordinata petiolata, petiolo minute appresse puberulo vel fere glabro plerumque eglanduloso, 1.5—2 cm longo, lamina subcoriacea elliptica vel obovato-elliptica, 8—13 × 4.5—8.5 cm, supra glabra haud verruculosa subtus verisimiliter resinosa vel glutinosa nonnunquam ad nervos pubescente vel nonnunquam glabra, apice paullo acuminata basi cuneata, costis lateralibus utrinsecus 8—11 supra leviter impressis subtus prominulis domatiis axillaribus vix pubescentibus. *Flores* (delapsi) in spicas axillares, 14 cm longas, rhachide fere glabro, dispositi. *Fructus* ellipsoideus irregulariter verrucosus et minute verruculosus glaber, 4—5 × 1.5—2 cm, apice rostratus.

NETHERLANDS NEW GUINEA. Mimika, Siere, alt. 5 m, 16 June 1941: *Lundquist 105* (BO, *type*). "In primary forest on sandy soil". Vernacular name: Keari.

The fruit is curiously irregularly warty (possible pathological?) and the surface further covered fairly densely with minute warts resembling those commonly met with on the leaves of *Terminalia* spp., which are said to be due to accumulations of crystals of calcium oxalate. In cross-section the fruit appears to have some foveolate tissue round the loculus surrounded by a thick band of sclerenchyma with short radial, spoke-like projections.

The relationship seems to be with *T. soembawana* Van Sloot. and *T. nitens* Presl from both of which it can be distinguished not only by the warty fruits, a character which may not be constant, but also by their structure in cross-section as described above.

Terminalia steenisiana Exell, sp. nov.

Arbor 10—15 m alta, ramulis primo appresse rufo-pubescentibus mox glabrescentibus. *Folia* and apices ramulorum conferta, petiolata, petiolo 10—20 mm longo, glabro, lamina subcoriacea elliptica obovato-elliptica obovata vel oblanceolata, 8—13 × 2.5—6 cm, supra nitida glabra opaca, apice rotundata obtusa vel breviter acuminata, basi cuneata, costis lateralibus utrinsecus 6—10. *Flores* albidi in spicas axillares 6—8 cm longas, rhachide glabro, bracteolis filiformibus 1 mm longis, dispositi; ♂ stipitati, stipite glabro 2 mm longo; ⚥ sessiles basin versus orti. *Receptaculum* inferius 2 mm longum glabrum, superius late cupuliforme glabrum, 1 × 3 mm. *Calycis lobi* deltoidei 1.5 mm longi glabri. *Stamina* 10, filamentis 2.5 mm longis glabris, antheris 0.5 mm longis. *Discus* dense pilosus. *Fructus* maturus ruber glaber in sicco ambitu ellipsoideus, 2.5—3.5 × 1.5—2.6 cm, ventrale planus dorsale convexus et paullo carinatus vel utrinsecus convexus plus minusve carinatus longitudinaliter circumalatus, ala rigida 2—3 mm lata.

BRITISH NEW GUINEA. Papua: Central Division, Nakeo District, alt. 30 m, 10 April 1933: *Brass 3759* (BM, *type*); Kanosia, edge of mangrove swamp, sea-level, 9 Febr. 1935, *Carr 11228* (A, BM, L). "Common; rain-forests; alt. 30 m; tree 10—15 m; grey-brown scaly bark; hard brown wood; leaves shiny; flowers white; fruit fleshy, red when ripe."

When I first saw the specimen Brass 3759 I thought it might be *T. foveolata* White & Francis (see Exell in Brittonia 2: 138, 1938) from the description but after seeing fruiting specimens of the latter at Kew I realize that the fruits are not the same and that *T. foveolata* is probably a glabrous form of *T. microcarpa* Decne.

T. steenisiana, which I have much pleasure in naming after my friend Dr. C. G. G. J. van Steenis, to whom I am much indebted for his valuable assistance and advice in my work on the Malaysian Combretaceae, seems to be related to *T. oreadum* Diels and *T. supitiana* Koord., differing from the former by the glabrous receptacle and from the latter by the smaller fruit.

Carr 11495 (A; BM) from Lolorica, growing in forest at 30 m, and *Carr 11255* (BM), from light forest at Kanosia, are probably the same species but with much younger, thinly papyraceous leaves and without fruits.

Terminalia canaliculata Exell, sp. nov.

Arbor 30 m alta, ramulis primo appresse pubescentibus mox glabrescentibus. *Folia* spiraliter ordinata ad apices ramulorum conferta petiolata, petiolo 1.5—3 cm longo, sparse appresse pubescente vel glabro, lamina chartacea obovata, obovato-elliptica vel elliptica, 8—15 × 4—7 cm, apice rotundata et acuminata basi cuneata, nitidula, canaliculis mucilaginosis pellucidis instructa, juventute sparse appresse pubescente mox glabrescente, costis lateralibus utrinsecus 9—13 in axillis domatiis conspicuis perforatis.

Flores in spicas axillares ad 13 cm longas, rhachide appresse pubescente, bracteolis caducis, dispositi, ♂ stipitati, stipite 1—1.5 mm longo appresse pubescente, apicem versus orti, ⚥ sessiles basin versus dispositi. *Receptaculum* inferius sericeum 2—2.5 mm longum, superius fere nullum. *Calycis lobi* triangulares, 2.5 × 1.5 mm, extra pubescentes vel fere glabri intus pilosuli. *Stamina* 10, filamentis glabris 3 mm longis, antheris 0.5 mm longis. *Discus* barbatus. *Stylus fructusque* ignoti.

BRITISH NEW GUINEA. Papua: Palmer River, 2 miles below junction with Black River, July 1936: *Brass 7350* (A; BM, *type*); Eastern District, Milne Bay area, ½ mile south of Waigani, alt. 10 m, Mar. 1945: *L. S. Smith N.G.F. 1379* (BRI). "Abundant in forests of lower ridges. Large semi-deciduous canopy tree; trunk spur-buttressed; bark brown, thin, flaky; wood pale, of cedar-like appearance; leaves (still young) concave; flowers white" (L. J. Brass). "Tree 90 ft overall. Bole 60 ft clear, buttressed to $3^{1}/_{2}$ ft and slightly channelled above. Bark $^{1}/_{8}$ to $^{3}/_{16}$ in. thick; outer pale brown, papery, scaly and also shedding in thin, curled, irregular flakes; inner green on the back, pale red within, concentrically layered and somewhat fibrous. Sapwood $1^{1}/_{2}$ in. thick, pale; heartwood red-brown. Native name: Kama". (L. S. Smith).

This species is remarkable for the linear, canal-like markings which are translucent when the leaves are held up to the light. Dr. C. A. Reinders-Gouwentak, Wageningen, has kindly investigated the structure of these cavities and has sent me the following report of which I have only very slightly modified the wording:

"In the leaves of *Terminalia* species there appear to be two kinds of transparency. One of them is due to large cells with large cluster crystals in the mesophyll and the other one to canal-like cavities containing mucilage and occurring above or within the xylem of the veins, or, without any such association, in the mesophyll. In the case of *Brass 7350* both features are present, but the crystals are rather inconspicuous and the peculiar appearance is due entirely to the large cavities. In transverse section the cavities are sometimes almost united, with very little mesophyll tissue between them. They are found not only above the xylem of the smaller veins or within the xylem of the larger and medium-sized veins but also in the mesophyll, with or without accompanying sclerenchymatous tissue. They are lined, at least in the herbarium material, with yellowish-brown epithelial cells. Heiden (Bot. Centralbl. 56: 10, 1893) mentions that *Terminalia pellucida* Presl has mucilaginous cavities and adds (tom. cit.: 70) that these are above the large veins".

T. pellucida seems to be the only other Malaysian species with this character; but the canal-like cavities are not nearly so striking as in *T. canaliculata.*

FLORAE MALESIANAE PRAECURSORES V.
NOTES ON MALAYSIAN RUBIACEAE

by

R. C. BAKHUIZEN VAN DEN BRINK JR
(Flora Malesiana, Leiden)

(Issued 18. XII. 1953)

I. ARGOSTEMMA.

Argostemma Wall. (type species: *A. verticillatum* Wall.).

This large Old World genus, comprising about 240 binomials of which ca 70—80 will prove to be distinct species, has been almost unanimously left undivided. Exceptions are Reinwardt who in 1825 created the genus *Pomangium,* independently of Wallich (1824) and Ridley who in 1927 based the genus *Argostemmella* on two Bornean species of *Argostemma.* My revision (in msc.) of *Argostemma* occurring in Malaysia confirmed the common view that there is no reason for splitting up this genus. However, several subdivisions (sections) can reasonably be accepted. As those sections mostly represent well-delimited taxa in connection with a rather evident distribution of their own, I propose here the following 5 sections for *Argostemma.* It should be borne in mind that I have examined almost all extra-Malaysian species too.

1. Sect. **Euargostemma** K. Schum. in Engl. & Prantl, Nat. Pfl. Fam. 4, 4, 1891, 32, p.p., typo incl.; Ridl., J. Bot. 65, 1927, 26, p. max. p. — *Argostemma* sect. *Monophyllum* K. Schum. in Engl. & Prantl, l. c. 1891, 32 — *Argostemma* sect. *Pomangium* (typo excl.) : *Verticillatae & Heterophyllae-Monophylleae,* Ridl., J. Bot. 65, 1927, 30.

Type species: *A. verticillatum* Wall.

2. Sect. **Pomangium** (Reinw.) Ridl., J. Bot. 65, 1927, 30 — *Pomangium* Reinw., Syll. Pl. Nov. Ratisb. 2, 1825, 10, pro genere — *Argostemma* sect. *Euargostemma* K. Schum. in Engl. & Prantl, Nat. Pfl. Fam. 4, 4, 1891, 32, p.p., typo excl. — *Argostemma* sect. *Pomangium* (typo incl.) : *Eupomangiae-Homophyllae,* Ridl., J. Bot. 65, 1927, 30.

Type species: *A. montanum* Bl. ex DC.

3. Sect. **Argostemmella** (Ridl.) Bakh. f. sect. nov. — *Argostemmella* Ridl., J. Bot. 65, 1927, 41, pro genere.

Type species: *A. gracile* Stapf.

4. Sect. **Elatostemoides** K. Schum. in Engl. & Prantl, Nat. Pfl. Fam. 4,

4, 1891, 32 — *Argostemma* sect. *Pomangium* (typo excl.): *Heterophyllae-Polyphyllae*, Ridl., J. Bot. 65, 1927, 30, 31.

Type species: *A. parvifolium* Benn.

5. Sect. **Borragineum** Bakh. f. sect. nov. — *Argostemma* sect. *Euargostemma* K. Schum. in Engl. & Prantl, Nat. Pfl. Fam. 4, 4, 1891, 32 p.p., typo excl. — *Argostemma* sect. *Pomangium* (typo excl.) : *Homophyllae*, Ridl., J. Bot. 65, 1927, 30, p.p.

Herbae ascendentes vel erectae, raro repentes, plerumque robustiores et suffruticulosae, rhizomate saepissime conspicuo et robusto, tuberis nullis. *Folia* pauca, distincte inter se remote decussata, ex eodem pari aequalia vel subaequalia stipulis multo maiora, raro valde inaequalia cum nanophyllis stipuliformibus. *Inflorescentia* cymosa, sive subumbelliformis sive axibus scorpioideis 1 — ca 160-flora. *Flores* 5-vel raro in parte 6-meri. *Corolla* subcampanulata, basin versus ultra mediam partita, raro campanulata. *Stamina* 5—(6) cohaerentia conica; conus staminalis subsessilis coriaceus, saepissime niger in sicco; connectivum dorso sensim in thecas transiens, connectivo et thecis ultimo sibi non distinguendis; antherae longitudinaliter dehiscentes.

Type species: *A. borragineum* Bl. ex DC.

1. **Argostemma buwaldae** (§ *Elatostemoides*) Bakh. f., spec. nov.

Herba ascendens, circa 13 cm longa. Caulis robustior glaber, internodiis 1.75—3 cm longis. *Folia* pauca, distincte remota valde inaequalia; folia normalia magis minusve ovato-lanceolata basi aequalia vel subaequalia cuneata acuta, apice breviter acuminata utrimque glabra, in sicco submembranacea, 12.5—14 cm longa, 4.5—5 cm lata, nervis lateralibus 10—13 gracillimis remotis, nervis secundariis et venis obscuris; petiolus glaber 6—8 mm longus; nanophylla et stipulae mox caduci, oblongo-lanceolati glabri ca 4 mm longi. *Inflorescentia* corymbosa ca 10-flora, ca 2.5 cm longa ramificationibus brevissimis; pedunculus glaber 1 cm longus; bracteae lanceolatae glabrae ad 3 mm longae; pedicelli pubescentes ca 4—5 mm longi. *Flores* 5-meri. *Calycis* tubus dense pubescens ca 1 mm longus; sepala ovata acuta glabra ca 1 mm longa. *Corolla* subrotata alba ca 5—7 mm longa; lobi ovato-oblongi acuti. Stamina 5 cohaerentia; conus staminalis subsessilis ovatus conspicue rostratus ca 5 mm longus; thecae appendice apicali multo longiores. *Stylus* subinclusus glaber ca 5 mm longus; stigma ellipticum. *Fructus* mihi ignoti.

SUMATRA, Riouw, Indragiri, primary forest: *Buwalda 6417* (BO, *type*), fl. Apr.

2. **Argostemma** (§ *Pomangium*) **fallax** Bakh. f., spec. nov..

Herba ascendens, minime 18 cm longa. Caulis sparse minute pilosellus, valde glabrescens. *Folia* pauca distincte remota, aequalia, ovato-oblonga — lanceolata vel ovata, basi acuta vel obtuso-rotundata, apice breviter et acutiuscule acuminata, supra sparse minute pubescentia scabridula, subtus in nervis sparse puberula, tenuia herbacea 3—6 cm longa, 1.25—3.25 cm lata, nervis lateralibus 7—9; petiolus gracilis minute pubescens ca 0.5—1.5 cm longus; stipulae anguste lanceolatae obtusiusculae glabrae vel subglabrae firmae ca 8—11 mm longae. *Inflorescentia* terminalis umbellata multiflora; pedunculus gracilis glaber ca 3—6 cm longus; bracteae parvae; pedicellus gracilis pubescens ca 1.25—1.75 cm longus. *Flores* 5-meri. *Calycis* tubus campanulatus dense pubescens ca 1.5 mm altus; sepala ovata acuta extus subglabra firma ca 1 mm longa. *Corolla* basin versus multo ultra partem dimidiam partita, alba ca 8—10 mm longa; lobi ovato-lanceolati caudato-acuminati extus glabri, intus graciliter lanati. Stamina 5 cohaerentia; conus staminalis ovato-lanceolatus acutus ca 8—9 mm longus; thecae appendice apicali multo longiores; filamenta glabra ca 0.5 mm longa. *Stylus* filiformis glaber, ca 10 mm longus, paulum exsertus, stigmate subellipsoideo. *Fructus* ignoti.

Sumatra, Westcoast, Korinchi Peak, Sungei Penoh: *Robinson & Kloss 20* (BM, *type*), fl. June.

3. **Argostemma** (§ *Borragineum*) **flavescens** Bakh. f., spec. nov.

Herba repens ad 25 cm longa. Caulis dense crispe-pubescens firmus, internodiis ca 4—8 mm longis. *Folia* pauca, distincte remota valde inaequalia; folia maiora elliptico-oblonga vel subrhomboidea basi obtusa, apice acuta, supra areolae secus nervis lateralibus dense crispe-pilosae cum areolis subglabris alternantes, pilis appressis in sicco luteolis, subtus pallida dense punctato-verruculata, in nervis pubescentia, herbacea, 1—3 cm longa, 0.75—1.5 cm lata; petiolus firmus pilosus 3—8 mm longus; nanophylla et stipulae isomorphi aequales vel subaequales vel minus frequenter partim inaequales, ovato-subcordati ca 2—4 mm longi; nanophylla supra pilosa, stipulae glabrae. *Inflorescentia* 1—(3)-flora, appresse crispe-pubescens; pedunculus robustior ca 1—2 cm longus; bracteae florales lanceolatae ad 3 mm longae. Flores 5-meri; pedicelli pubescentes ca 5—8 mm longi, subaccrescentes. *Calycis* tubus semiovoideus dense pubescens ca 2 mm longus; sepala late ovata acuta extus pilosa ca 1 mm longa. *Corolla* campanulata ca 4 mm longa. *Stamina* 5 cohaerentia; conus staminalis subsessilis ovatus coriaceus ca 2 mm longus. *Stylus* pilosus conspicue exsertus ca 4 mm longus; stigma ellipticum. *Fructus* subglobosi dense pilosi ca 3—4 mm longi.

Borneo, West Borneo, Sarawak, Matang: *Haviland 84/75* (SING, *type*; CAL); ibidem: *Beccari 621* (FI).

4. **Argostemma** (§*Euargostemma*) **neurosepalum** Bakh. f., spec. nov. — *Argostemma acuminatum* (non King) Ridl., Fl. Mal. Pen. 2, 1923, 23, p.p.

Herba erecta, ca 17—23 cm longa, rhizomate probabiliter tuberuso. Caulis infra apicem verticillis foliorum valde reductorum singulis vel paucis praeditus, verticilla superiore persistente, laminis lanceolato-linearibus ad 7 mm longis, basin versus foliolis destitutus glaber. *Folia* ex eodem nodo aequalia vel subaequalia, caulis apice conferta quasi-verticillata; folia maiora 4—6, lanceolata basi decurrentia, apice acute caudato-acuminata membranacea utrimque sparse minute pubescentia, marginibus graciliter ciliatis, subtus pallida nervis lateralibus ca 12—15 tenuibus obscuris avenia vel subavenia, (5)—7—15 cm longa, (1.5)—3—4.5 cm lata; petiolus gracilis pilis paucis sparse vestitus; stipulae lanceolatae ad 0.5 cm longae. *Inflorescentia* terminalis umbellata vel scorpioidea maxime ca 20-flora, ca 6—7.5 cm longa, parte florifera ad 1 cm longa; pedunculus gracilis glaber 5—6.5 cm longus. *Flores* 4-meri; pedicellus tenuis graciliter patente-puberulus 7.5 mm longus. *Calycis* tubus campanulatus dense appresse pilosellus ca 1 mm longus; sepala magna tubo longiora, oblongo-lanceolata acuta ciliata membranacea trinervia ca 23 mm longa, sub fructu longitudine ad 4 mm acrrescentia. *Corolla* nondum ad medium divisa, 3.3 mm longa; tubus late campanulatus basin versus abrupte angustatus, utrimque glaber ca 2 mm longus; lobi valde reflexi ovati acutissimi, extus distincte nervosi et venosi, ca 1 mm longi. *Stamina* 4 libera prope corollae basin affixa; filamenta glabra ca 1 mm longa; antherae late lineares, basi subcordatae apice breviter rostratae, poro apicali dehiscentiae, ca 3 mm longae. *Stylus* filiformis glaber ca 2.5 mm longus, stigmate subclavato. Discus applanatus glaber. *Fructus* immaturi semiglobosi piloselli ca 3 mm diametientes.

MALAY PENINSULA, Perak, Lenggong: *Ridley 14479* (K, *type*; CAL, SING), fl. Aug.

5. **Argostemma** (§ *Pomangium*) **subfalcifolium** Bakh. f., spec. nov. — *Argostemma lanceolarium* (non Ridl.) Merr., Mitt. Inst. Bot. Hamburg 7, 4, 1937, 277.

Herba ascendens, ad 35 cm alta. Caulis gracilis dense transverse bullato-striatus. *Folia* pauca distincte remota, valde inaequalia; nanophylla stipuliformia; folia maiora subfalcato-lanceolata, basi aequalia vel inaequalia acuta, apice acute caudato-acuminata, glabra, 2.5—16 cm longa, 0.75—3.5 cm lata; nervis lateralibus ca 6—9 subconspicuis; petiolus glaber ca 5—6.5 mm longus; nanophylla et stipulae subisomorphi sessiles oblongo-lanceolati glabri venosi firmi ca 3—12 mm longi, stipulis paullum longioribus et latioribus. *Inflorescentia* terminalis corymbiformis vel umbellata laxa pauci- ad multiflora, parte florifera ad 6 cm longa, axibus distinctis; pedunculus glaber ca 0.7—7 cm longus. *Flores* 5-meri; bracteae nanophyllis et stipulis similes, sed apicem versus sensim minores, semipersistentes involucrales, infimae maiusculae ad ca 5 mm longae; pedicellus gracilis pubescens ca 7.5—10 mm longus. *Calycis* tubus anguste campanulatus dense pilosus ca 2 mm altus; sepala ovata vel ovato-oblonga acuta vel minute acuminata glabra avenia ca 2.5—3.5 mm longa, hypanthio longiora, non reflexa. *Corolla* fere ad basin partita alba 6—6.5 mm longa; lobi ovato-lanceolati subacuminati glabri venulati. *Stamina* 5 cohaerentia; conus staminalis ovato-lanceolatus acutus ca 6 mm longus; thecae appendice apicali sublongiores. *Stylus* filiformis glaber ca 7 mm longus, stigmate ovali. *Fructus* fere semiglobosi conspicue sulcati subglabri ca 3.5—5 mm longi, sepalis accrescentibus persistentibus coronati.

BORNEO, West Borneo, Bidang Menabei, primary forest, alt. 700 m: *H. Winkler 791* (H, NY), fl. Dec.; Bukit Mehipit, forest, alt. 500 m: *H. Winkler 660* (H, NY); East and Northeast Borneo, West Kutai, Mt Kemul, primary forest, alt. 1600 m: *Endert 4327* (BO, L), fl. Oct.; West Borneo, Sarawak, Dulit Range, primary rainforest, alt. about 100 m: *P. W. Richards 2090 A* (K, *type*), fl. Sept.; Mt Kinabalu, Penibukan: *J. & M. S. Clemens 30650* (BM, BO, GH, K, L, UC), fl. fr. Jan.; *idem 31963* (BM, BO, GH, L, UC), fl. March.

6. **Argostemma uniflorum** Bl. ex DC., Prodr. 4. 1830, 418.

Var. **curtum** Ridl. ined.

Herba nana, ad ca 10 cm longa (pedunculo incluso). *Folia* lanceolata vel obovato-lanceolata, basi longe vel breviter decurrentia acuta, apice anguste cuneata acuta, supra subglabra vel in costa solum pubescentia, subtus avenia pallida, ca 2—3 cm longa, ca 7—12 mm lata; petiolus tenuis ca 4—6 mm longus; nanophylla et stipulae isomorphi oblongo-lanceolati glabri ad 5 mm longi. *Flores* solitarii; pedunculus gracilis glaber ca 0.5—1 cm longus; pedicellus pubescens 6—8 mm longus. *Corolla* ca 4—5 mm longa. *Stylus* ca 5 mm longus.

SUMATRA, West Coast, Mt Talakmau, alt. 900 m: *Bünnemeyer 504* (BO), fl. Apr.; East Coast, Simelungun between Siantar and Prapat, forest, alt. 900—1000 m: *Yates 995* (K, *type*; UC), fl. fr. Sept.; Sibolangit, above Bandarbaru, alt. 1000 m: *Lörzing 5345* (BO, L), fl. Oct.; ibidem: *Lörzing 5811* (BO, L), fl. July; Kp. Serpang, alt. 400 m: *Galungi 485* (BO), fr. July; Agam, Brani, alt. 950 m: *Bünnemeyer 3151* (BO, L), fl. June; Riouw-Lingga Arch., P. Singkep, forest near Manggu, alt. 60 m: *Bünnemeyer 7158* (BO), fl. fr. Aug.

Differs from the type variety by the peculiar dwarfy habit, the flowers which are smaller in all details, the short pedicels and the veinless lower surface of the leaves.

Var. **pilosellum** Bakh. f., var. nov.

Herba ascendens, ad ca 30 cm longa. *Folia* lanceolata vel angustoria, basi apiceque acuta, utrimque, costa excepta, glabra subavenia, 2—5 cm longa, 0.75—2 cm lata; petiolus 4—7 mm longus; nanophylla et stipulae isomorphi lanceolati vel lineari-lanceolati glabri ad 7 mm longi. *Flores* solitarii; pedunculus gracilis appresse graciliter pilosellus ca 0.75—2 cm longus; pedicellus pilosus ca 0.75—1 cm longus. *Corolla* ca 1—1.3 cm longa. *Antherae* sulphureae.

SUMATRA, Atjeh, Mt Goh Lembuh, near Putih falls, alt. 1200 m: *Van Steenis 8964* (BO, *type*; L), fl. Febr.; idem, alt. 1200—1500 m: *Van Steenis 8963* (BO, L), fl. Febr.

7. **Argostemma aequifolium** Ridl., J. Roy. As. Soc. Str. Br. 35, 1901, 15.

Var. **albo-ciliatum** (Ridl.) Bakh. f., stat. nov. — *A. albociliatum* (*-a*) Ridl., J. Roy. As. Soc. Str. Br. 35, 1901, 15.

8. **Argostemma borragineum** Bl. ex DC., Prodr. 4, 1830, 417.

Var. **corymbosum** (Ridl.) Bakh. f., stat. nov. — *A. corymbosum* Ridl., J. Mal. Br. Roy. As. Soc. 1, 1923, 67.

forma **ovatum** (Ridl.) Bakh. f., stat. nov. — *A. ovatum* Ridl., J. Fed. Mal. Stat. Mus. 8, 4, 1917, 45.

9. **Argostemma distichum** Val. in Nova Guinea 8, 1911, 447.

Ssp. **quadripetalum** (Elm.) Bakh. f., stat. nov. — *A. quadripetalum* (sph. *quadripetiolata*) Elm., Leafl. Philip. Bot. 1, 1906, 361, 63.

10. **Argostemma grandiflorum** Ridl., J. Roy. As. Soc. Str. Br. 74, 1918, 77.

Var. **lammii** (Val.) Bakh. f., stat. nov. — *A. lammii* Val., Bot. Jahrb. 60, 1—2, 1925, 39, in clavi.

11. **Argostemma parvifolium** Benn., Pl. Jav. Rar. (1838), 96.

Var. **involucratum** (Hemsl.) Bakh. f., stat. nov. — *A. involucratum* Hemsl., Hook. Icon. 16, 1887, t. 1556 — *A. pulchrum* Korth., Ned. Kr. Arch. 2, 2, 1851, 122 (*neotype: Bünnemeyer 3609* [BO, *type*; L, *isotype*]).

Argostemmatis species excludendae.

12. *Argostemma fulvum* Z. & M. in Moritzi, Zoll. Syst. Verz. (1846) 61 = **Pomazota fulva** (Z. & M.) Bakh. f., comb. nov. (syn.: *Coptophyllum pilosum* Miq., 1869 — *Pomazota pilosa* (Miq.) Bremek., 1947).

13. *Argostemma gesnerella* Wernh., Trans. Linn. Soc. 9, 1916, 66 = **Ophiorrhiza** spec.

14. *Argostemma membranaceum* King, J. As. Soc. Beng. 72, 1903, 145 = **Epithema** cf. **saxatile** Bl. (Gesner.).

15. *Argostemma microcnide* Miq., Fl. Ind. Bat. Suppl. 1, 1860, 539 = **Ophiorrhiza bracteata** Korth. (1851).

16. *Argostemma nubicola* Wernh., Trans. Linn. Soc. 9, 1916, 66 = **Ophiorrhiza** spec.

II. BIKKIA.

1. **Bikkia tetrandra** (L. f.) A. Gray, Proc. Amer. Acad. 4, 1860, 307.
Ssp. **guilloviana** (Brongn.) Bakh. f., stat. nov. — *Bikkia guilloviana* Brongn., Bull. Soc. Bot. France 13, 1866, 42.

III. CRUSEA.

1. *Bigelovia mitracarpoides* Miq., Fl. Ind. Bat. 2, 1856, 334 = **Crusea rubra** (Jacq.) Cham. & Schlecht. (1830).

IV. LERCHEA.

1. **Lerchea paniculata** Back. ined., spec. nov. — *Lerchea interrupta* (non Korth.) Ridl., J. Fed. Mal. Stat. Mus. 8, 4, 1917, 46.
Var. **paniculata.**

Suffrutex ad ca 75 cm altus. Caulis glaber minute verrucosus, parte superiori in vivo purpureus. *Folia* numerosa lanceolata vel oblanceolata, basi acuta attenuata, apicem versus attenuata acuta vel acute acuminata, supra glabra, subtus pallida, glabra vel in nervis primariis papillosa, 9—18 cm longa, 2.5—4 cm lata, nervis 13—24 erecto-patentibus; *stipulae* semi-persistentes integrae, ovato-lanceolatae acutissimae vel acuminatae, marginibus valde replicatis, glabrae 8—17 mm longae; petiolus glaber 2—6 cm longus. *Inflorescentiae* terminales vel pseudo-laterales, spicato-paniculiformes, 10—19 cm longae, axibus glabris vel papillosis; pedunculus brevis vel longus, 1—8 cm. *Flores* omnes in cymas breviter pedunculatas collecti; cymae numerosae remotiores pauciflorae saepe cincinnatae, basi bractea lineari-lanceolata ad 1 cm longa sustentae; cymarum pedunculi graciles 2—10 cm longi, inferiores maximi, valde reflexi; pedicellus glaber vel pilosellus ad 2 mm longus. *Calycis* tubus glaber 1 mm altus; sepala ovata vel oblonga obtusa ca 0.5 mm longa, omnia vel pleraque persistentia, glabra vel ciliata. *Corolla* alba, ca 3 mm longa; tubus cylindricus 2 mm longus extus glaber, intus in parte superiore pilosus; lobi triangulares acuti 1 mm longi, fauce pilosa. *Stamina* inclusa, infra corollae tubi medium affixa;

filamenta pilis paucis sparse praedita; antherae lineares obtusae ca 0.75 mm longae. *Stylus* glaber ca 2 mm longus, stigmate subbifido papillaceo. *Fructus* 1—2 mm longi globosi subdidymi glabri vel papilloso-piloselli sepalis accrescentibus coronati.

Java, Priangan, G. Bulud, SW of Tjibeber, alt. 1000 m: *Winckel 1725 β* (L, *type*), fl. fr. Oct.; G. Bèsèr, near Tjidadap: *Bakhuizen van den Brink 243* (L), fl. fr. Sept.
Sumatra, Westcoast, Siolak Dras, about 900 m: *Robinson & Kloss s.n.* (K, BM), fr. March; Korinchi Mt, Sandaran Agong, alt. ± 730 m: *Robinson & Kloss 166* (BM), fl. fr. May; Benculen, Passumah, Bt Tinggi, about 1100 m: *Forbes 2200* (L).

Var. **beccariana** Bakh. f., var. nov.

Differt a typo inflorescentiae multo maiore ad 33 cm longa, cum caule et foliorum nervatione pilosella, stipulis applanatis, foliis maioribus ca 5.5—8 cm latis.

Sumatra, Westcoast, Sungei Bulu: *Beccari 926* (L, *type*); BM, FI, K), fl. Sept.; locality unknown: *Korthals s.n.* (L).

V. XANTHOPHYTUM.

1. **Xanthophytum** Reinw. ex Bl., Cat. (1823) 17, descr. — *Paedicalyx* Pierre ex Pitard in Fl. Gén. Ind.-Chine 3, 1922, 88, fig. 10: 5 — *Xanthophytopsis* Pitard in l. c. 3, 1922, 90, fig. 10: 7—8.

2. **Xanthophytum glomeratum** Valeton ined., spec. nov.

Var. **glomeratum.**

Suffrutex erectus minime 2 m altus. Caulis in speciminibus a me examinatis non ramosus robustus, parte superiore pilis patentibus vel subpatentibus rufis longiusculis dense hirsutus, basin versus valde glabrescens. *Folia* oblongo-lanceolata vel subobovato-oblonga ad oblanceolata, basi acuta haud decurrentia, apice acutiuscula vel brevissime acuminata, crassiuscula, supra glabra vel pilis paucis praedita subtus pilis appressis longis rufis dense vestita, marginibus conspicue ciliatis, 7—14 cm longa, 3.5—5.5 cm lata; nervis lateralibus 13—15 subtus elevatis, nervis secundariis et venis numerosis subtus conspicuis; *stipulae* late obovato-spathulatae vel ovato-lanceolatae crassiusculae supra pilosae subglabrescentes, subtus praecipue in nervis dense subappresse pilosae, nervis multis densis percursae, ca 1.5—2 cm longae; petiolus robustiusculus pilis patentibus rufis hirsutus, 2—2.5 cm longus. *Capitula* globosa ca 7.5 mm diametientia; bracteae et bracteolae subaequales lineares pilosae ca 1.5 cm longae. *Flores* incompleti tantum a me visi. *Calycis* tubus subglobosus dense pilosus ca 1 mm altus; sepala 5 subaequalia, basi leviter connata linearia 3—5 mm longa, in fructibus longiora, parte dimidia superiore extus et intus pilosa. *Corollae* tubus 3 mm longus, extus glaber intus in parte superiori tantum pilosus; lobi ignoti. *Stamina* a me non visa. *Stylus* glaber 1.75 mm longus. *Discus* glaber. *Capsula* breviter pedicellata globosa dense pilosa ca 2—2.5 mm longa.

Borneo, West Borneo, Sarawak, Gat, Upper Rejang River, forest: *J. & M. S. Clemens 21721* (K, *type*); Sarawak, exact locality unknown: *Beccari 2797* (FI), fl. Sept.

Var. **semiorbiculare** Bakh. f., var. nov.

Caulis gracilis, parte superiore rufo-pilosulus, basin versus glabrescens. *Folia* elliptico-oblonga, rarius late lanceolata, basin et apicem versus distincte decurrentia, acuminata minute pilosa vel hirsuta, ca 13—18 cm longa, 5—8 cm lata; *stipulae* semiorbiculares ad late obovatae, ciliatae sparse pilosulae vel hirsutae, graciliter multinerviae, ca 10—17 mm longae, 12—23 mm latae. *Capitula* globosa, eis varietatis typicae maiora, in inflorescentiam amplexicaulem conspicuam 2—3 cm diametientem collecta. *Flores* 5-meri, longe pedicellati, pedicellis sub fructu valde elongatis. *Calycis* tubus globosus sparse pilosus vel longe hirsutus ca 1 mm longus; sepala linearia ca 2 mm longa pilosa vel hirsuta, sub fructu valde vel vix ampliata. *Corolla* 4.5 mm longa; tubus 3.5 mm longus, extus glaber intus pilosulus; lobi ovato-oblongi acuti, apice extus pilis paucis longis praedita, ceterum glabri. *Stamina* 5, in medio tubi affixa, paulum e fauce exserta; filamenta glabra longa; antherae lineares ca 0.8 mm longae. *Stylus* inclusus, glaber ca 4 mm longus, stigmate lineari.

BORNEO, West Borneo, Landak: *Teysmann 11224* (BO); East and Northeast Borneo, Bukit Kasian: *Jaheri 1046* (BO, *type*); Sg. Blu-u; *Jaheri 375* (BO); Sg. Pary: *Jaheri 1134* (BO).

3. **Xanthophytum grandifolium** Valeton ined., spec. nov.

Frutex robustus ad 4 m altus. Caulis pilis appressis castaneis dense vestitus glabrescens, innovationibus distincte angulatis; ramuli floriferi simplices. *Folia* lanceolata vel lineari-lanceolata, rarius oblonga, basi cuneata vel longe et acute decurrentia, apice attenuata acutissima vel acuminata, supra sparse pilosa, subtus densiuscule appresse pilosa (8)—19—32 cm longa, (3)—5.5—10 cm lata, nervis lateralibus 14—22 remotis subtus conspicue elevatis laxe venosa herbacea; *stipulae* integrae vel bifidae ovato-lanceolatae vel subtriangulari-lanceolatae, maiores 10—18 mm longae, 4—9 mm latae, apice acutae vel subulato-acuminatae, extus carinatae, utrimque dense appresse pilosae, maiores 10—18 mm longae, 4—9 mm latae; petiolus robustus dense appresse pilosus, (2.5)—3.5—6 cm longus. *Inflorescentiae* 4—14 cm longae, longe pedunculatae, in partibus superioribus capitula 3—4 manifeste pedunculata gerentes; pedunculus 4.5—10 cm longus dense appresse pilosus; capitula ca 0.5—2 cm diametientia, valde congesta globosa vel cymosa, cymis 2—3 densis umbelliformibus; capitulorum pedunculi in bractearum magnarum axillis positi pubescentes 0.5—1.5 cm longi; bracteae semipersistentes oblongo-lanceolatae acutae dense minute pubescentes, ca 1—1.5 cm longa, pedunculo aequilongae vel longiores, pedunculum in parte inferiore amplectentes; bracteae involucrales exteriores ca 5 mm longae, interiores minutae; pedicelli graciles pubescentes 1—1.5 mm longi, accrescentes, in fructu 4 mm non superantes. *Calycis* tubus campanulatus ca 0.75 mm altus, pilis persistentibus erectis minutis dense vestitus; sepala ovata acuta vel acutiuscula, utrimque latere dense minute pubescentia ca 0.5 mm longa. *Corolla* alba; tubus cylindricus vel leviter infundibuliformis 4—5 mm longus, utrimque quoad partem dimidiam superiorem solum pilis parvis paucis vel pilis longis numerosissimis vestitus; lobis acuti 0.75 mm longi extus pilis erectis paucis muniti, intus glabri. *Stamina* 5, circiter ad medium corollae tubum adnata; antherae lineares paulum exsertae vel inclusae, ca 1 mm longae. *Stylus* in parte superiore sparse pilosus 4—5 mm longus, stigmate clavato crasso. *Discus* sublobatus. *Capsula* subglobosa vel ovoidea 2—2.5 mm longa; semina numerosa.

BORNEO, West Borneo, Penein Mts: *Teysmann s.n.* (L, *type*), fl. fr. Sept.; G. Lianggagang, near S. Mandai: *Hallier s.n.* (K, L, U), fl. fr. fr. March-Apr.; ibidem: *Hallier 2634* (NY, SING, U); Kapuas: *Teysmann 8176* (BO, FI); East and Northeast Borneo, Sungei Buleng, upper course of Mahakam River: *Amdjah 114* (L), fl. fr. Oct.; West Borneo, Sarawak: *Beccari 4017* (FI, K); Rejang: *Haviland 712* (K); Kapit, Upper Rejang River, riverine forest, shrub up to 10 ft: *J. & M. S. Clemens 21404* (K); Gat, Upper Rejang River, forest: *ibidem 21774* (K); Lio Matu, Upper Baram: *Moulton 6701/5* (K, SING), fl. fr. Oct.; ibidem: *Moulton 30* (SING), fl. fr. Oct.; Dulit Range, rain forest, below 300 m, shrub up to 4 m tall: *P. W. Richards 1039* (K), fl. fr. July.

List of collector's numbers.

(The numbers between brackets indicate the numbering of the species).
Amdjah 114 (V 3); Bakhuizen van den Brink 243 (IV 1); 621 (I 3), 926 (IV 1), 3797 (V 2), 4017 (V 3); Bünnemeyer 504 (I 6), 3151 (I 6), 7158 (I 6); Buwalda 6417 (I 1); Clemens (J. & M. S.) 21404 (V 3), 21721 (V 2), 21774 (V 3), 30650 (I 5), 31963 (I 5); Endert 4327 (I 5); Forbes 2200 (IV 1); Galungi 485 (I 6); Hallier sn (V 3), 2634 (V 3); Haviland 84/75 (I 3), 712 (V 3); Jaheri 375 (V 2), 1046 (V 2), 1134 (V 2); Korthals sn (IV 1); Lörzing 5345 (I 6), 5811 (I 6); Moulton 30 (V 3), 6701/5 (V 3); Richards (P. W.) 1039 (V 3), 2090 A (I 5); Ridley 14479 (I 4); Robinson & Kloss sn (IV 1), 20 (I 2), 166 (IV 1); Steenis (van) 8963 (I 6), 8964 (I 6); Teysmann sn (V 3), 8176 (V 3), 11224 (V 2); Winckel 1725 β (IV 1); Winkler 660 (I 5), 791 (I 5); Yates 995 (I 6).

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(Synonyms in italics).

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    forma **ovatum** (Ridl.) Bakh. f. I 8
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BEMERKUNGEN ZU EINIGEN VON C. E. CARR IN NEUGUINEA GESAMMELTEN MOOSEN

von

P. ARENS
(Hilversum)

(Herausgegeben am 18. XII. 1953)

In den Jahren 1935 und 1936 sammelte C. E. Carr in Papua u. a. auch ziemlich viele Moose. Diese Sammlung wurde H. N. Dixon zur Bearbeitung übergeben. Die Originale der von diesem Bryologen aus dieser Sammlung kurz vor und während dem Kriege neu beschriebenen Arten liegen in seinem Herbarium, das jetzt im British Museum untergebracht ist. Ein Teil der Carr'schen Sammlung wurde vom Rijksherbarium in Leiden angekauft, darunter auch viele Nummern, die jetzt als Cotypen der Dixon'schen novae species gelten können. Da der Ankauf schon vor dem Kriege betätigt wurde, diese Moose also noch nicht bestimmt waren, überliess Herr Prof. Dr. H. J. Lam, der Direktor des Rijksherbariums, mir diese Moose noch während dem Kriege in liebenswürdiger Weise zur Bestimmung, wofür ich ihm auch hier danken möchte. Erst nach dem Kriege konnten die inzwischen über diese Moose erschienenen Veröffentlichungen Dixon's eingesehen und mit meinen eigenen Befunden verglichen werden. Ueber das Resultat möchte ich im Folgenden berichten.

Fissidens wichurae Broth. et Fl. in Hedw. 38, 1899, p. 127. — *Fissidens pungentissimus* Dixon in Journ. of Bot., Jan. 1942, p. 2.

Diese neue Art wurde auf Grund von *C. E. Carr's no. 13542* aufgestellt. Das Duplikat dieser Nummer im Rijksherbarium enthält neben *F. silvaticus* Griff nur noch *F. wichurae* Broth. et Fl. Vergleicht man die ausführliche Beschreibung, die Fleischer in Musci von Buitenzorg p. 32 von diesem letzten Moose gibt, mit Dixon's Diagnose von *F. pungentissimus*, dann stimmen diese beiden Beschreibungen fast gänzlich überein bis auf die Blattzellen, die bei *F. wichurae* "dicht warzig", bei der var. *brevifolius* Fl. "weniger warzig", bei *F. pungentissimus* nach Dixon "laeves" sind. Bei dem Material des Rijksherbariums sind die Blattzellen deutlich papillös. Dixon hebt noch als besonders kennzeichnend für sein *F. pungentissimus* hervor, dass "the extreme tip of the leaf is often inflexed rather abruptly in a curious way". Genau dasselbe ist aber auch der Fall bei *F. wichurae*. Dies alles macht es wahrscheinlich, dass *F. pungentissimus* Dix. als Synonym zu *F. wichurae* Broth. et Fl. gezogen werden muss.

Da aber *Carr's no. 13542* in verschiedene Teile geteilt wurde, war es immerhin möglich dass das Exemplar, das Dixon vorgelegen hat, noch eine *Fissidens*-Art enthielt, die im Konvolut in Leiden fehlt. Ich bat darum Herrn Norkett vom British Museum Natural History Dixon's Original zu vergleichen, was Herr Norkett in liebenswürdiger Weise getan hat. Er schrieb mir das Folgende: "I quite agree that this species should be sunk under *wichurae* Broth. et Fl. I have thoroughly examined Dixon's slide on which it is reasonable to assume he based the description, and there are distinct papillae present. Not perhaps so prominent as I have seen in one or two cases but nevertheless not sufficient to say it is any different. All the other characters also agree". *Fissidens pungentissimus* Dix. (1942) ist also zweifellos dasselbe wie *F. wichurae* Broth. et Fl. (1899) und muss als Synonym zu dieser Art gezogen werden.

Synodontia novae-guineae (Dix.) Arens, comb. nov. — *Eucamptodon novae-guineae* Dixon in Farlowia I, 1943, p. 29.

Von diesem Moose sagt Dixon l. c.: "The generic position is uncertain as the two possible genera, *Dicnemos* and *Eucamptodon*, are separated on peristome characters, and the single old peristome seen leaves it uncertain wether the teeth are entire, or possibly cleft above when perfect".

Das im Rijksherbarium von derselben Sammelnummer *C. E. Carr no. 15104* liegende Material ist besser erhalten. Das Peristom ist einfach und besteht aus 16 rotbraunen, oben gelben, überall schmal gelb gesäumten, ca 1100 μ langen Zähnen, die an der Basis breit sind und mit einander zu einer ca 100 μ hohen Grundhaut verwachsen sind, nach oben hin sich plötzlich verschmälern und sich in etwa 300 μ Höhe über der Basis in zwei, zuweilen drei unregelmässig knotige, divergierende Schenkel teilen, von denen jeweils der rechte Schenkel des einen Zahnes sich dem linken des Nachbarzahnes nähert und mit diesem auf etwa 600 μ über der Basis zu einem in der Mittellinie mehr oder weniger durchlöchertem, etwa 400—500 μ langen Gebilde verwächst, das an einen Zahn von z. B. *Distichium* erinnert. Im oberen Teil sind die Zähne hier und da gestreift.

Es handelt sich also um ein typisches *Synodontia*-Peristom. Dieses Moos muss darum in die Gattung *Synodontia* gestellt werden.

In Verdoorn's Musci critici et selecti Ser. V. no. 207 wurde dieses Moos unter dem Namen *Brotherobryum Macgregorii* (Broth. et Geh.) Fl. (det. H. N. Dixon) herausgegeben. Diese Bestimmung war falsch. Bei seinem eigenen Konvolut hat nach freundlicher Mitteilung des Herrn Alston vom British Museum Dixon dann später einen Zettel mit den Namen *Eucamptodon novo-guineae* Dix. über den verkehrten Namen geklebt.

Durch das Auffinden dieser Art in Neuguinea wird das Areal der Gattung in interessanter Weise erweitert. Alle bisher beschriebenen Arten von *Synodontia* stammen nämlich aus Neukaledonien, dessen Flora auch sonst viele Elemente mit Neuguinea gemeinsam hat, und eine Art von der bei Neukaledonien liegenden Insel Aneityum.

Taxithelium merrillii Broth. in Philip. Journ. Sc. 13, 1918, Sect. Bat., p. 219. — *Taxithelium novae-guineae* Dixon in Farlowia I, 1943, p. 39.

C. E. Carr sammelte das von Dixon beschriebene Moos unter *no. 11470* an einem für ein Moos ganz ungewöhnlichen Standort, nämlich "on stilt roots of Rhizophora etc. and subject to inundation at very high tides. Sea level." Nun hat Brotherus in Philip. Journ. Sc. XIII, 1918, Sect. Bot.,

p. 219 ein *T. merrillii* Broth. veröffentlicht, das nach Bartram, Philippine Mosses p. 334 ebenfalls wächst "on roots of mangrove trees covered with salt or brackish water on extreme high tides". Dieser merkwürdige Standort macht es wahrscheinlich, dass es sich in beiden Fällen um ein und dieselbe Art handelt.

Durch die freundliche Vermittlung des Herrn Prof. Dr. v. d. Wijk in Groningen konnte ich Originalmaterial aus dem Herbarium Brotherus in Helsinki mit dem von Carr gesammelten Material vergleichen. Dabei zeigte sich, dass *T. novae-guineae* Dix. (1943) tatsächlich mit *T. merrillii* Broth. (1918) identisch ist und darum eingezogen werden muss.

Auch dieses Moos wurde in Verdoorn's Musci selecti et critici Ser. IV. Jan. 1937 unter no. 197 herausgegeben.

A REVIEW OF THE GENUS ERYCIBE ROXB.

by

R. D. HOOGLAND

(Canberra)

(Issued 18. XII. 1953)

In this paper I intend to give a review of the genus *Erycibe* Roxb. in which all the names published in the genus will be accounted for. The representatives from Malaysia have been dealt with more extensively in the revision of the genus in Flora Malesiana, Ser. I, Vol. 4, 4th instalment, 1953, pp. 404—431. — Technical descriptions of new taxa have been published in another paper in Blumea 7, 1953, pp. 310—319.

In the present paper the literature will be published more extensively than in Flora Malesiana; besides I have included citation of all type specimens. The extra-Malaysian species have been studied less extensively than the Malaysian ones, but as I have seen nearly all the types, some notes are inserted which will be, I hope, useful for future study of the genus. Particularly the specimens from the Indian Peninsula need closer study.

An enumeration of the species was given by Hallier f. (Bull. Herb. Boiss. 5, 1897, p. 737—739); this enumeration was adapted for the Netherlands Indies by Boerlage (Handl. Fl. Ned. Ind. 2, 2, 1899, p. 508). There are some other local revisions and enumerations, the most important of which are: Prain, J. As. Soc. Beng. 74, II, 1906, p. 287—296 (Malay Peninsula), Gagnepain & Courchet, Fl. Gén. Ind.-Ch. 4, 1915, p. 304—310 (Indo-China), Merrill, En. Philip. Fl. Pl. 3, 1923, p. 358—359 (Philippines), Masamune, En. Phan. Born., 1942, p. 633 (Borneo), How, Sunyatsenia 6, 1946, p. 221—230 (China), Kerr, Fl. Siam. En. 3, 1951, p. 94—98 (Siam).

The genus *Fissipetalum* was described by Merrill with doubtful reference to *Olacaceae* or possibly *Icacinaceae.* Sleumer (in Engler & Prantl, Nat. Pfl. Fam. 2nd ed. 16b, 1935, p. 32) excluded the genus from *Olacaceae* and expressed doubt as regards its affinities to *Icacinaceae.* Later on he excluded it from the latter family (in Engl. & Prantl, Nat. Pfl. Fam. 2nd ed. 20b, 1942, p. 293) and brought it, correctly, into synonymy under *Erycibe.* Independently the same was done by Airy Shaw (Kew Bull. 1947, 1947, p. 22).

Typification. For *E. paniculata* Roxb. the specimen from the Roxburgh-herbarium in Brussels (Herbarium Martii) has been chosen as the lectotype as there is a label attached to this specimen indicating that this is the plant figured. The types of some of the early described species (Blume's species, *E. obtusifolia* Benth.), for which no specimens were cited, have been chosen from the material seen by the authors and labelled in their handwriting (lectotype), the other specimens being considered paratypes. For species for which more than one collection was cited by the author, one of these has been chosen as the lectotype, preferably the specimen in the herbarium where the author has worked, unless the author has indicated a holotype: the other collections mentioned are paratypes. For species described by Prain the lectotype is considered to be in the Calcutta herbarium; I have not seen these but I have seen duplicates of all lectotypes of his species. I have only seen isotypes of *E. angustifolia* Hallier f. (holotype in München), *E. hirsuta* Hallier f. (holotype in Hamburg?), *E. sumatrensis* Merr. (holotype said to be in NY, though it was not among the material sent on loan to me), *E. dolichotricha* Merr. (holotype said to be in NY), *E. schmidtii* Craib (holotype in Aberdeen?).

Among the specimens send to me on loan there are a number of which the material is insufficient for identification. Some of these probably belong to one of the species listed below, but there are also some probably representing new species. The material of the latter is, however, too incomplete to base new species on it.

I express my sincere thanks to the directors of the herbaria from which I have been able to study the specimens. These herbaria have been cited by the abbreviations proposed in the Index Herbariorum.

ERYCIBE

Erycibe Roxb., Pl. Corom. 2, 1798, p. 31, t. 159; type species *E. paniculata* Roxb. l. c. — *Catonia* Vahl, Skrivt. Nat. Hist. Selsk. Kiøbenh. 6, 1810, p. 98; type species (lectotype) *C. elliptica* Vahl l. c. p. 101, = *Erycibe paniculata* Roxb. — *Erimatalia* Roem. & Schult., Syst. 5, 1819, p. XXVII; type species *E. rheedii* R. & S. l. c. p. 331, = *Erycibe paniculata* Roxb. — *Fissipetalum* Merr., J. Str. Br. R. A. S. 85, 1922, p. 168; type species *F. borneense* Merr. l. c., = *Erycibe borneensis* (Merr.) Hoogl.

Infrageneric taxa (all published without indication of rank): *Rimosae* Hallier f., Bull. Herb. Boiss. 5, 1897, p. 737; type species (lectotype) *E. subspicata* Wall. ex G. Don — *Tereticaules* Hallier f. l. c. p. 738; type species (lectotype) *E. stapfiana* Prain — *Venulosae* Hallier f. l. c. p. 738 (under *Tereticaules*); type species (lectotype) *E. stapfiana* Prain — *Fibrosae* Hallier f. l. c. p. 739 (under *Tereticaules*); type species (lectotype) *E. forbesii* Prain.

1. **Erycibe aenea** Prain, J. As. Soc. Beng. 58, II, 1894, p. 85; Prain, J. As. Soc. Beng. 74, II, 1906, p. 295; Ridl., Fl. Mal. Pen. 2, 1923, p. 446; Moore, J. of Bot. 62, 1924, Suppl. p. 71; Burk. & Henders., Gard. Bull. S. S. 3, 1925, p. 400; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 933; Hoogl., Fl. Mal. I, 4, 1953, p. 424.

Types: *Kunstler 7337*, lectotype in CAL, isotypes in B, G, K, L.

Distr. Malay Peninsula, Sumatra.

2. **Erycibe albida** Prain, J. As. Soc. Beng. 58, II, 1894, p. 87; Hoogl., Fl. Mal. I, 4, 1953, p. 414. — *E. glomerata* Auct. non Bl.; Hallier f., Bull. Herb. Boiss. 5, 1897, p. 382, 739, p.p.; Prain, J. As. Soc. Beng. 74, II, 1906, p. 294 (excl. syn. *E. angustifolia*); Ridl., Fl. Mal. Pen. 2, 1923, p. 447; Burk. & Henders., Gard. Bull. S. S. 3, 1925, p. 400; Kerr, Fl. Siam. En. 3, 1951, p. 96. — *E. glomerata "var. typica"* Prain, J. As. Soc. Beng. 74, II, 1906, p. 294; Ridl., Fl. Mal. Pen. 2, 1923, p. 448. — *E. glomerata* var. *longifolia* Auct. non Bl.; Prain, J. As. Soc. Beng. 74, II, 1906, p. 295 (excl. syn. *E. angustifolia*); Ridl., Fl. Mal. Pen. 2, 1923, p. 448.

Types: *Kunstler 7373,* lectotype in CAL, isotypes in B, BM, G, K, L; paratypes Scortechini s.n. (not seen), *Curtis 2947* (K, SING).

Distr. Peninsular Siam, Malay Peninsula.

3. **Erycibe beccariana** Hoogl., Blumea 7, 1953, p. 310; Hoogl., Fl. Mal. I, 4, 1953, p. 428.

Types: *Beccari P.P. 91,* holotype in FI; paratype *Beccari P.P. 532* (FI).

Distr. New Guinea.

4. **Erycibe borneensis** (Merr.) Hoogl., Blumea 7, 1953, p. 310; Hoogl., Fl. Mal. I, 4, 1953, p. 424. — *Fissipetalum borneense* Merr., J. Str. Br. R. A. S. 85, 1922, p. 168; Merr., Univ. Calif. Publ. Bot. 15, 1929, p. 58.

Types: *Ramos 1454,* lectotype in K, isotypes in A, B.

Var. **borneensis.**

Distr. Borneo.

Var. **collina** Hoogl., Blumea 7, 1953, p. 310; Hoogl., Fl. Mal. I, 4, 1953, p. 424.

Types: *Clemens 40357,* Penibukan, Mt Kinabalu, 1200 m, 9. IX. 1933, holotype in L, isotypes in A, BM, BO, G, K, UC; paratypes: *Clemens 40258,* same locality, 8. VIII. 1933 (A, BM, BO); *Clemens 40388,* same locality, 17. IX. 1933 (BM, K, SING); *Clemens 40418A,* same locality, 22. IX. 1933 (BM, L); *Clemens 40418B,* same locality, IX—X. 1933 (BM); *Clemens 40438,* same locality, 26. IX. 1933 (BM); *Hose 627,* Mt Irekan, 600 m, VII. 1895 (BM, K).

Distr. Borneo.

Var. *collina* particularly differs from var. *borneensis* by the indumentum on the outer side of the sepals. In general the flowers are distinctly different by this character. A single intermediate collection is known: *Motley (Barber) 6* (K).

5. **Erycibe brassii** Hoogl., Blumea 7, 1953, p. 311; Hoogl., Fl. Mal. I, 4, 1953, p. 430.

Types: *Brass 7981,* holotype in L, isotype in A.

Distr. New Guinea.

6. **Erycibe bullata** Ridl. ex Hoogl., Blumea 7, 1953, p. 311; Hoogl., Fl. Mal. I, 4, 1953, p. 422.

Types: *Hose 572,* Baram, Sarawak, 10. IV. 1895, holotype in K; paratypes: *Beccari P. B. 651,* Kuching, Sarawak, IX. 1865 (FI); *Haviland & Hose s.n.,* Kuching, Sarawak, 13. XI. 1894 (K); *Haviland & Hose 3708,* Baram, Sarawak, VIII. 1894 (K); *Haviland & Hose 3730,* Rejang, Sarawak, 1894 (K).

Distr. Borneo.

7. **Erycibe carrii** Hoogl., Blumea 7, 1953, p. 312; Hoogl., Fl. Mal. I, 4, 1953, p. 421.

Types: *Carr 15000,* holotype in L, isotype in BM; paratypes: *Carr 13583* (L); *Clemens 11056* (A).

Distr. New Guinea.

8. **Erycibe citriniflora** Griff., Notul. 4, 1854, p. 284; Prain, J. As. Soc. Beng. 73, II, 1904, p. 17; Brandis, Indian Trees, 1906, p. 714; Ridl., Fl. Mal. Pen. 2, 1923, p. 445; Kerr, Fl. Siam. En. 3, 1951, p. 94; Hoogl., Fl. Mal. I, 4, 1953, p. 425. — *E. glomerata* (non Bl. 1826) Wall. [Cat., 1828, no 1338, nomen] ex Choisy, Ann. Sc. Nat. Sér. 2, 1, 1834, p. 224; DC., Prod. 9, 1845, p. 465 (excl. syn. *E. glomerata* Bl.); Kurz, For. Fl. Br. Burma 2, 1877, p. 213; Clarke, Fl. Br. Ind. 4, 1883, p. 183; Prain, J. As. Soc. Beng. 63, II, 1894, p. 85. — *E. wallichii* Prain & Hallier f. ex Hallier f., Bull. Herb. Boiss. 5, 1897, p. 382; Prain, J. As. Soc. Beng. 73, II, 1904, p. 17; Brandis, Indian Trees, 1906, p. 483. — *E. hololobula* Kerr, Kew Bull. 1941, 1941, p. 11; Kerr, Fl. Siam. En. 3, 1951, p. 96.

Types: *E. citriniflora: Griffith 390* (distr. *5881*), lectotype in K, isotypes in K, P; *E. glomerata*: *Wallich 1338,* holotype in G; *E. wallichii* = preceding; *E. hololobula*: *Kerr 16371,* holotype and isotype in K.

Distr. Burma, Siam, Malay Peninsula.

9. **Erycibe clemensae** Van Ooststr., J. Arn. Arb. 29, 1948, p. 414, f. 1, pl. 1; Hoogl., Fl. Mal. I, 4, 1953, p. 429.

Types: *Clemens 1622,* holotype in L, isotype in A; paratype *Clemens 1502* (L).

Distr. New Guinea.

10. **Erycibe coccinea** (F. M. Bail.) Hoogl., Fl. Mal. I, 4, 1953, p. 431. — *E. paniculata* var. *coccinea* F. M. Bail., Dept Agric. Queensl. Bot. Bull. 8, 1893, p. 80; F. M. Bail., Queensl. Fl. 4, 1901, p. 1053; F. M. Bail., Compr. Cat. Queensl. Pl., 1909, p. 347, f. 325. — *E. paniculata* Auct. non Roxb.; Benth., Fl. Austral. 4, 1869, p. 411; F. M. Bail., Queensl. Fl. 4, 1901, p. 1053; F. M. Bail., Compr. Cat. Queensl. Pl., 1909, p. 347.

Type: *Cowley s.n.,* holotype in BRI.

Distr. Queensland.

11. **Erycibe cochinchinensis** Gagnep., Not. Syst. 3, 1915, p. 138; Gagnep. & Courch., Fl. Gén. Ind.-Ch. 4, 1915, p. 308; Kerr, Fl. Siam. En. 3, 1951, p. 94.

Types: *Harmand 1298,* lectotype in P, isotypes in A, BO, P; paratypes: *Thorel s.n.* (P); *Pierre s.n.,* Cây Công (K, NY, P); *Pierre s.n.,* Ton-mán (BM, BO, BR, G, NY, P).

Distr. Indo-China, Siam.

12. **Erycibe coriacea** Wall. [Cat., 1828, no 1337, nomen] ex Choisy, Ann. Sc. Nat. Sér. 2, 1, 1834, p. 224; DC., Prod. 9, 1845, p. 465; Drury, Handb. Ind. Fl. 2, 1866, p. 324; Kurz, For. Fl. Br. Burma 2, 1877, p. 213; Clarke, Fl. Br. Ind. 4, 1883, p. 182; Prain, J. As. Soc. Beng. 65, II, 1896, p. 536; Brandis, Indian Trees 1906, p. 484; Kerr, Fl. Siam. En. 3, 1951, p. 93; Hoogl., Fl. Mal. I, 4, 1953, p. 417. — *E. fragrans* Wall. [Cat., 1828,

no 1336, nomen] ex G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392. — *E. coriacea* var. *pauciflora* DC., Prod. 9, 1845, p. 465. — *E. coriacea* var. *fragrans* (Wall. ex G. Don) Clarke, Fl. Br. Ind. 4, 1883, p. 182.

Types: *E. coriacea*: *Wallich 1337*, holotype in G; *E. fragrans*: *Wallich 1336*, holotype in K, isotypes in B, BM, G, K, L; *E. coriacea* var. *pauciflora*: = preceding, holotype in G.

Distr. Chittagong, Peninsular Burma, W. Siam.

According to Prain (J. As. Soc. Beng. 73, II, 1904, p. 17 under *E. citriniflora*) Kurz's reference partly applies to *E. citriniflora* Griff.. As I have not seen the material from the Calcutta Herbarium, on which Kurz's Forest Flora of British Burma was mainly based, I cannot confirm this statement.

13. **Erycibe crassipes** Ridl. ex Hoogl., Blumea 7, 1953, p. 312; Hoogl., Fl. Mal. I, 4, 1953, p. 422.

Types: *Haviland 3116*, Kuching, Sarawak, 9. V. 1893, holotype in K; paratypes: *Haviland 2265*, Kuching, Sarawak, 25. I. 1893 (K); *Haviland & Hose 3725*, Kuching, Sarawak, III. 1893 (K); *Van Steenis 1212*, E. slope of G. Ranai, Bunguran, Natuna Islands, 250 m, 10. IV. 1928 (BO, L, SING; fa *glabra* Hoogl.).

Fa **crassipes.**

Distr. Borneo.

Fa **glabra** Hoogl., Blumea 7, 1953, p. 312; Hoogl., Fl. Mal. I, 4, 1953, p. 422.

Types: *Van Steenis 1212*, holotype in L, isotypes in BO, SING.

Distr. Natuna Islands, 4° N 107° E.

14. **Erycibe crassiuscula** Gagnep., Not. Syst. 3, 1915, p. 139; Gagnep. & Courch., Fl. Gén. Ind.-Ch. 4, 1915, p. 306, f. 36.

Types: *Bon 5569*, holotype and isotypes in P.

Distr. Indo-China, once collected.

Though the type collection is not very good, I think it may represent indeed a good species. Nevertheless it is possible that it is only an aberrant, small-leaved form of *E. elliptilimba* Merr. & Chun.

15. **Erycibe elliptilimba** Merr. & Chun, Sunyatsenia 2, 1934, p. 45; Masamune, Fl. Kainant., 1943, p. 272; How, Sunyatsenia 6, 1946, p. 227; Hoogl., Fl. Mal. I, 4, 1953, p. 419. — *E. fecunda* Kerr, Kew Bull. 1941, 1941, p. 10; Kerr, Fl. Siam. En. 3, 1951, p. 96. — *E. noei* Kerr, Kew Bull. 1941, 1941, p. 11; Kerr, Fl. Siam. En. 3, 1951, p. 97. — *E. rabilii* Kerr, Kew Bull. 1941, 1941, p. 12; Kerr, Fl. Siam. En. 3, 1951, p. 97. — *E. poilanei* Gagnep., Not. Syst. 14, 1950, p. 28. — *E. paniculata* Auct. non Roxb.; Gagnep. & Courch., Fl. Gén. Ind.-Ch. 4, 1915, p. 305.

Types: *E. elliptilimba*: *Liang 61534*, holotype in NY, isotypes in A, E, K, P; paratype: *Liang 61684* (A, NY); *E. fecunda*: *Kerr 8535*, holotype and isotype in K; *E. noei*: *Noe 210*, holotype in K; *E. rabilii*: *Rabil 225*, holotype and isotype in K; *E. poilanei*: *Poilane 416*, holotype and isotypes in P.

Distr. China (Hainan), Indo-China, and Siam.

16. **Erycibe expansa** Wall. [Cat., 1828, no 1331, nomen] ex G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; Clarke, Fl. Br. Ind. 4, 1883, p. 181;

Prain, J. As. Soc. Beng. 63, II, 1894, p. 84; Brandis, Ind. Trees, 1906, p. 483; Prain, J. As. Soc. Beng. 74, II, 1906, p. 289; Ridl., Fl. Mal. Pen. 2, 1923, p. 445; Kerr, Fl. Siam. En. 3, 1951, p. 95; Hoogl., Fl. Mal. I, 4, 1953, p. 426. — *E. paniculata* var. *expansa* (Wall. ex G. Don) Choisy ex DC., Prod. 9, 1845, p. 464; Miq., Fl. Ind. Bat. 2, 1859, p. 1032. — *E. ferruginosa* Griff., Notul. 4, 1854, p. 283.

Types: *E. expansa*: *Wallich 1331/2*, lectotype in K, isotypes in K, G; paratypes *Wallich 1331/1* (B, G, K); *E. ferruginosa*: *Griffith s.n.*, holotype and isotype in K.

Distr. Peninsular Burma and Siam and (?) Nicobar Islands.

Wallich 1331 as a whole is the type of the species. This collection consists of specimens representing two species, the present one and *E. peguensis* (Clarke) Prain. Clarke was the first to realise this, and he retained the name *E. expansa* for the species represented by the collection from Tavoy (1331/2). As to the typification of the species he must be followed. The two species are here considered to be distinct, though narrowly related.

There is only a single, fragmentary, old collection from the Nicobar Islands (*Anonymus 225*, G).

17. **Erycibe festiva** Prain, J. As. Soc. Beng. 58, II, 1894, p. 87; Prain, J. As. Soc. Beng. 65, II, 1896, p. 536; Prain, J. As. Soc. Beng. 74, II, 1906, p. 292; Ridl., Fl. Mal. Pen. 2, 1923, p. 447; Burk. & Henders., Gard. Bull. S. S. 3, 1925, p. 400; Hoogl., Fl. Mal. I, 4, 1953, p. 417.

Types: *Kunstler 6445*, lectotype in CAL, isotypes in B, BM, G, K, L, SING, UC; paratype *Hullett 624* (not seen).

Distr. Malay Peninsula, Banka, Java.

18. **Erycibe floribunda** Pilger, Bot. Jahrb. 59, 1924, p. 84; Van Ooststr., J. Arn. Arb. 29, 1948, p. 416; Hoogl., Fl. Mal. I, 4, 1953, p. 420.

Types: *Moszkowski 308*, lectotype in B; paratype *Moszkowski 305* (B).

Distr. New Guinea.

19. **Erycibe forbesii** Prain, J. As. Soc. Beng. 73, II, 1904, p. 15; Moore, J. of Bot. 62, 1924, Suppl. p. 71; Hoogl., Fl. Mal. I, 4, 1953, p. 420.

Types: *Forbes 1454*, holotype in CAL, isotypes in B, BM, FI, K, SING.

Distr. Sumatra, Java, Kangean Archipelago, Borneo, Philippines.

The Philippine specimens differ from the Sumatran and Javanese ones in fruiting stage, the fruit being scurfy for the whole surface, whereas it is smooth in the lower part, scurfy in the upper part in the Sumatran and Javanese specimens. I have not been able to find reliable differences in the flowering specimens. The only specimen known from Borneo is a flowering one.

20. **Erycibe glaucescens** Wall. [Cat., 1828, no 1334] ex Choisy, Ann. Sc. Nat. Sér. 2, 1, 1834, p 223; G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; DC., Prod. 9, 1845, p. 464; Miq., Fl. Ind. Bat. 2, 1859, p. 1033, p.p.; Kurz, For. Fl. Br. Burma 2, 1877, p. 213; Clarke, Fl. Br. Ind. 4, 1883, p. 181; Brandis, Indian Trees, 1906, p. 484; Kanjilal, Das, Kanjilal, & De, Fl. Assam 3, 1939, p. 361. — *E. laevigata* Wall. [Cat., 1828, no 1333, p.p.]

ex Choisy, Ann. Sc. Nat. Sér. 2, 1, 1834, p. 223; G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; DC., Prod. 9, 1845, p. 464; Drury, Handb. Ind. Fl. 2, 1866, p. 323.

Types: *E. glaucescens*: *Wallich 1334,* holotype in G, isotypes in B, G, K; *E. laevigata*: *Wallich 1333,* holotype in G, isotypes in B, BM, E, G, K, L.

Distr. Bengal (Silhet) and Peninsular Burma.

Under *Wallich 1333* 2 species are represented. The one described by Choisy is slightly different from *E. glaucescens* Wall. ex Choisy, though I think not specifically. The other, for which the name *E. laevigata* has usually been used, should probably be named *E. schmidtii* Craib (see there).

21. **Erycibe glomerata** Bl., Bijdr. 16, 1826, p. 1047; G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; Miq., Fl. Ind. Bat. 2, 1859, p. 1033; Hallier f., Bull. Herb. Boiss. 5, 1897, p. 382; Koord., Exk. Fl. Java 3, 1912, p. 115; Van Ooststr. in Back., Bekn. Fl. Java (Nooduitg.) 8, 1949, fam. 191, p. 8; Hoogl., Fl. Mal. I, 4, 1953, p. 419. — *E. glomerata* var. *longifolia* Bl., Bijdr. 16, 1826, p. 1047; G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; Hallier f., Bull. Herb. Boiss. 5, 1897, p. 382; Merr., Bibl. En. Born. Pl., 1921, p. 507 (excl. syn. *E. longifolia* Becc.); Masamune, En. Phan. Born., 1942, p. 633. — *E. angustifolia* Hallier f., Bot. Jahrb. 16, 1893, p. 524.

Types: *E. glomerata*: *Blume 720,* lectotype in L, paratypes *Blume s.n.* (L, U); *E. glomerata* var. *longifolia*: *Blume s.n.,* lectotype in L; paratypes *Blume 1721* (L), *Blume s.n.* (NY); *E. angustifolia*: *Beccari PB 188,* holotype in M, isotypes in BM, BO, FI, G, K, P, UC.

Ssp. **glomerata.** — *E. glomerata* Bl., *E. glomerata* var. *longifolia* Bl.

Distr. Sumatra, Java.

Ssp. **angustifolia** (Hallier f.) Hoogl., Fl. Mal. I, 4, 1953, p. 419. — *E. angustifolia* Hallier f.

Distr. Borneo.

The two subspecies differ primarily in the indumentum on the outer side of the sepals. I do not think the differences are sufficient to keep them apart as distinct species, but in view of the geographical isolation I have given them the rank of subspecies.

22. **Erycibe grandiflora** Adelb. in Hoogl., Blumea 7, 1953, p. 313; Hoogl., Fl. Mal. I, 4, 1953, p. 428.

Types: Cultivated in Hortus Bogoriensis under no XVI. A. 2a, holotype in L, isotypes in BO; paratypes idem XVI. A. 2 (B, BO, L), *Beccari PP 920* (FI), *Britton & Winder 71* (A, L), *Ledermann 10434* (L), *Meyer Drees 224* (BO), *Feuilletau de Bruyn 323* (L), *Ledermann 10434* (L), *Meyer Drees 224* (BO), *Womersley NGF 4362* (L).

Distr. New Guinea.

23. **Erycibe grandifolia** Merr. ex Hoogl., Blumea 7, 1953, p. 313; Hoogl., Fl. Mal. I, 4, 1953, p. 420. — *E. angulata* Auct. non Prain; Merr., J. Mal. Br. R. A. S. 1, 1923, p. 29; Merr., Univ. Calif. Publ. Bot. 15, 1929, p. 259; Masamune, En. Phan. Born., 1942, p. 633. — *E. rheedii* Auct. non Bl.; Merr., Philip. J. Sc. 29, 1926, p. 413; Masamune, En. Phan. Born., 1942, p. 633.

Types: *Elmer 21455*, Tawao, Elphinstone Prov., British North Borneo, X. 1922—III. 1923, holotype in L, isotypes in A, B, BM, BO, C, G, K, MO, NY, P, SING, U, UC; paratypes *Agama 705*, near Betotan River, Sandakan District, British North Borneo, 29. V. 1919 (A, K, P); *Agama & Kadir A 2818*, Lun Manggis, Sandakan, British North Borneo, 21. V. 1950 (SING); *Castro & Melegrito 1608*, Banguey Island, British North Borneo (A, BO, K, UC); *Elmer 21313*, Tawao, Elphinstone Prov., British North Borneo, X. 1922—III. 1923 (A, B, BM, BO, C, G, K, L, MO, NY, P, SING, U, UC); *Elmer 21824*, same data (A, B, BM, BO, C, G, K, L, MO, NY, P, SING, U, UC); *Endert 4872*, near Long Pukus, W. Kutai, alt. 80 m, 14. XI. 1925 (BO); *Van Slooten 2254*, NE of Stagen, Pulau Laut, alt. 75 m, 5. XI. 1928 (BO); *Van Slooten 2283*, same locality, alt. 100 m, 6. XI. 1928 (BO).

Distr. Borneo, along the E. coast from N. to S.

The specimens cited above certainly do not belong to *E. rheedii* Bl. (syn.: *E. angulata* Prain), but represent a good species, characterised by the impressed venation below and the short, dark purplish red indumentum of different parts.

24. **Erycibe griffithii** Clarke, Fl. Br. Ind. 4, 1883, p. 182; Prain, J. As. Soc. Beng. 63, II, 1894, p. 85; Hallier f., Bull. Herb. Boiss. 5, 1897, p. 738, p.p.; Brandis, Ind. Trees, 1906, p. 295; Ridl., Fl. Mal. Pen. 2, 1923, p. 447; Burk. & Henders., Gard. Bull. S. S. 3, 1925, p. 400; Kerr, Fl. Siam. En. 3, 1951, p. 96 (syn. *E. maingayi* excl.: Hallier f. 1897, Prain 1906, Ridl. 1923); Hoogl., Fl. Mal. I, 4, 1953, p. 411, f. 13. — *E. cupreum* Gagnep., Not. Syst. 14, 1950, p. 27.

Types: *E. griffithii*: *Griffith s.n.*, lectotype in K; paratypes *Griffith s.n.* (distr. *5880*) (K), *Maingay 2572* (distr. *1520*) (K); *E. cupreum*: *Poilane 29904*, lectotype and isotype in P; paratype *Poilane 29846* (P).

Distr. Indo-China, Peninsular Burma and Siam, Malay Peninsula.

25. **Erycibe hainanensis** Merr., Philip. J. Sc. 21, 1922, p. 353; Merr., Lingn. Sc. J. 5, 1927, p. 153; Masamune, Fl. Kainant., 1943, p. 272; How, Sunyatsenia 6, 1946, p. 223. — *E. bachmaense* Gagnep., Not. Syst. 14, 1950, p. 27.

Types: *E. hainanensis*: *MacClure 8547*, lectotype in A, isotypes in K, MO, NY, P; *E. bachmaense*: *Poilane 29895*, lectotype and isotypes in P.

Distr. China (Hainan, Kwantung) and Indo-China.

I do not agree with Gagnepain in his opinion that *Poilane 29895* represents a different species. The flowerbuds are too young to see the character of the fimbriate margin of the lobules of the corolla, and the indicated difference in the indumentum of the leaves is insufficient for specific distinction as this character is rather variable in the Hainan specimens; the latter may be nearly identical to *Poilane 29895*.

26. **Erycibe hellwigii** Prain, J. As. Soc. Beng. 63, II, 1894, p. 84, note; K. Schum. & Laut., Fl. Deut. Schutzgeb. Südsee, 1901, p. 518, p.p.; Moore, J. of Bot., 61, 1923, Suppl. p. 37; Van Ooststr., J. Arn. Arb. 29, 1948, p. 414; Hoogl., Fl. Mal. I, 4, 1953, p. 423. — *E. paniculata* Auct. non Roxb.; Warb., Bot. Jahrb. 13, 1891, p. 413, p.p.

Types: *Hellwig 87*, lectotype in CAL, isotypes in B, BM, BO, K; paratype *Forbes 439* (BO, FI, K, L).

Distr. New Guinea.

27. Erycibe henryi Prain, J. As. Soc. Beng. 73, II, 1904, p. 15; Dunn, J. Linn. Soc. Bot. 39, 1911, p. 446; Sasaki, Cat. Govt Herb. Formosa, 1930, p. 424; Yamamoto, J. Soc. Trop. Agric. 6, 1934, p. 552; How, Sunyatsenia 6, 1946, p. 225. — *E. obtusifolia* Auct. non Benth.; Hayata, Ic. Pl. Formos. 2, 1912, p. 122, and Suppl. to Vol. 6, 1917, p. 50. — *E. acutifolia* Hayata, Ic. Pl. Formos. 9, 1919, p. 76; Yamamoto, Suppl. Ic. Pl. Formos. 1, 1925, p. 44; Sasaki, Cat. Govt Herb. Formosa, 1930, p. 424.

Types: *E. henryi*: *Henry 1884*, lectotype in CAL, isotypes in A, BM, E, NY; *E. acutifolia*: *Hayata & Sasaki s.n.* (Formosa Herbarium *20525*), holotype in Formosa Herbarium, photo of holotype in A.

Distr. Formosa, Liukiu Islands, S. Japan (Yakushima).

I have not seen the figure of this species in Makino & Nemoto, Nippon-shokubutsu-sôran (Flora of Japan), 2nd ed., 1931, p. 974.

28. Erycibe hollrungii Hoogl., Blumea 7, 1953, p. 314; Hoogl., Fl. Mal. I, 4, 1953, p. 418. — *E. paniculata* Auct. non Roxb.; K. Schum. & Hollr., Fl. Kais. Wilhelmsl., 1889, p. 114. — *E. hellwigii* Auct. non Prain; K. Schum. & Laut., Fl. Deut. Schutzgeb. Südsee, 1901, p. 518, p.p.

Types: *Hollrung s.n.*, holotype in B, isotypes in B, BO, K, L, P.

Distr. New Guinea.

29. Erycibe impressa Hoogl., Blumea 7, 1953, p. 314; Hoogl., Fl. Mal. I, 4, 1953, p. 430.

Types: *Clemens 29099*, Kundusan, Kinabalu, British North Borneo, alt. 50 m, 10. IV. 1932, holotype in L, isotypes in A, BM, BO, G, K.

Distr. British North Borneo, once collected.

30. Erycibe induta Pilger, Bot. Jahrb. 59, 1924, p. 86; Hoogl., Fl. Mal. I, 4, 1953, p. 430.

Types: *Ledermann 10397*, holotype in B, isotypes in K, L.

Distr. New Guinea.

31. Erycibe kinabaluensis Hoogl., Blumea 7, 1953, p. 315; Hoogl., Fl. Mal. I, 4, 1953, p. 416.

Type: *Carr SF 27115*, Upper Kinunut Valley, Kinabalu, British North Borneo, alt. 1200 m, 26. IV. 1933, holotype in SING.

Distr. Borneo, once collected.

32. Erycibe leucoxyloides King ex Prain, J. As. Soc. Beng. 73, II, 1904, p. 16; Prain, J. As. Soc. Beng. 74, II, 1906, p. 292; Ridl., Fl. Mal. Pen. 2, 1923, p. 446; Henders., Gard. Bull. S. S. 4, 1927, p. 100; Henders., Gard. Bull. S. S. 4, 1928, p. 292; Hoogl., Fl. Mal. I, 4, 1953, p. 415.

Types: *Ridley 6897*, lectotype in CAL, isotypes in BM, K, SING; paratypes: *Curtis 2402* (BM, SING), *Hallier s.n.* (G, L), *Ridley 2051* (not seen), *Ridley 10927* (not seen).

Distr. Malay Peninsula.

33. Erycibe macrophylla Hallier f., Bull. Herb. Boiss. 5, 1897, p. (739), 741; Koord., Exk. Fl. Java 3, 1912, p. 115; Dakkus, Bull. Jard. Bot. Btzg Suppl. 1, 1930, p. 131; Hoogl., Fl. Mal. I, 4, 1953, p. 424.

Types: *Hallier C 22a,* lectotype in L, isotypes in L, G; paratypes *Hallier C 22b* (G), C. H. B. XVI. A. 13 (BO), *Kurz s.n.* (not seen).

Distr. Java.

34. **Erycibe magnifica** Prain, J. As. Soc. Beng. 73, II, 1904, p. 18; Prain, J. As. Soc. Beng. 74, II, 1906, p. 289; Ridl., Fl. Mal. Pen. 2, 1923, p. 445; Burk. & Henders., Gard. Bull. S. S. 3, 1925, p. 400; Hoogl., Fl. Mal. I, 4, 1953, p. 412.

Types: *Kunstler 3454,* lectotype in CAL, isotypes in BM, E, K, SING, UC; paratypes: *Kunstler 3897* (K, P), *Kunstler 6721* (K).

Distr. Malay Peninsula.

35. **Erycibe maingayi** Clarke, Fl. Br. Ind. 4, 1883, p. 182; Hallier f., Bull. Herb. Boiss. 5, 1897, p. 1052; Hoogl., Fl. Mal. I, 4, 1953, p. 417. — *E. griffithii* Auct. non Clarke; Prain, J. As. Soc. Beng. 74, II, 1906, p. 295, p.p.; Ridl., Fl. Mal. Pen. 2, 1923, p. 447, p.p.

Types: *Maingay 1718* (distr. *1156*), lectotype and isotype in K.

Distr. Sumatra, Malay Peninsula, Borneo.

36. **Erycibe malaccensis** Clarke, Fl. Br. Ind. 4, 1883, p. 182; Prain, J. As. Soc. Beng. 63, II, 1894, p. 85; Prain, J. As. Soc. Beng. 74, II, 1906, p. 291; Ridl., Fl. Mal. Pen. 2, 1923, p. 446; Burk. & Henders., Gard. Bull. S. S. 3, 1925, p. 400; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 944; Hoogl., Fl. Mal. I, 4, 1953, p. 428. — *E. paniculata* Auct. non Roxb.; Naves & Villar, Novissima Appendix, 1880, p. 139; Vidal, Sinopsis, 1883, p. 195, Atlas t. 71, f. A; Vidal, Revis. Pl. Vasc. Filip., 1886, p. 195. — *E. dubia* Elm., Leafl. Philip. Bot. 2, 1909, p. 589; Merr., En. Philip. Fl. Pl. 3, 1923, p. 358. — *E. celebica* Hallier f. in Elbert, Sunda-Exped., 1912, p. 286, nomen.

Types: *E. malaccensis*: *Maingay 2209* (distr. *1154*), lectotype in K; paratypes *Griffith s.n.* (K), *Lobb s.n.* (K), *Maingay 2205* (distr. *1154*) (K), *Maingay 2209A* (distr. *1154*) (K), *Maingay* (distr. *1154*) (B, L); *E. dubia*: *Elmer 10342,* lectotype in L, isotypes in A, BM, BO, E, FI, G, K, MO, NY.

Distr. Peninsular Burma, Malay Peninsula, Philippines, Celebes.

37. **Erycibe micrantha** Hallier f., Bot. Jahrb. 16, 1893, p. 524; Hoogl., Fl. Mal. I, 4, 1953, p. 412. — *E. griffithii* Auct. non Clarke; Hallier f., Versl. Plantent. Btzg 1895, Bijl. 2, 1896, p. 126; Merr., En. Philip. Fl. Pl. 3, 1923, p. 358; Dakkus, Bull. Jard. Bot. Btzg Suppl. 1, 1930, p. 131. — *E. lateraliflora* Elm., Leafl. Philip. Bot. 5, 1913, p. 1767; Merr., Philip. J. Soc. Bot. 11, 1916 (issued 1917), p. 309 (lateriflora). — *E. javanica* Koord. & Val., Bijdr. 13 Booms. Java, 1914, p. 37; Van Ooststr. in Back., Bekn. Fl. Java (nooduitg.) 8, 1949, fam. 191, p. 9.

Types: *E. micrantha*: *Cuming 1743,* lectotype in G, isotypes in FI, G, K; *E. lateraliflora*: *Elmer 12750,* lectotype in L, isotypes in A, B, BM, BO, E, FI, G, K, MO, NY, P, U; *E. javanica*: *Koorders 9985 β*, lectotype in BO, isotypes in BO, L.

Distr. Sumatra, Java, Borneo, Philippines, Moluccas.

38. **Erycibe myriantha** Merr., Lingn. Sc. J. 13, 1934, p. 70; Masamune, Fl. Kainant., 1943, p. 272; How, Sunyatsenia 6, 1946, p. 224.

Types: *Tsang & Fung (555) L. U. 18089,* holotype in NY, isotypes in A, BM, BO, E, G, K, MO, NY, P, SING.

Distr. Hainan.

39. **Erycibe nitidula** Pilger, Bot. Jahrb. 59, 1924, p. 85; Hoogl., Fl. Mal. I, 4, 1953, p. 422.

Types: *Schlechter 16941*, holotype in B, isotypes in P, UC.

Distr. New Guinea.

40. **Erycibe obtusifolia** Benth., Fl. Honkong., 1861, p. 236; Forb. & Hemsl., J. Linn. Soc. Bot. 26, 1890, p. 156; Dunn & Tutcher, Kew Bull. Add. Ser. 10, 1912, p. 178; Merr., Lingn. Sc. J. 11, 1932, p. 55; Handel-Mazz., Beih. Bot. Centralbl. 56, 1937, p. 451; Masamune, Fl. Kainant., 1943, p. 272; How, Sunyatsenia 6, 1946, p. 225. — *E. glaucescens* Auct. non Wall. ex Choisy; Hook. & Arn., Bot. Beechey's Voy., 1841, p. 201. — *E. boniana* Gagnep., Not. Syst. 3, 1915, p. 137; Gagnep. & Courch., Fl. Gén. Ind.-Ch. 4, 1915, p. 309. — *E. laevigata* Auct. non Wall. ex Choisy nec aliores; How, Sunyatsenia 6, 1946, p. 228.

Types: *E. obtusifolia*: *Makikis (?) 165* (Herb. Benthamianum), lectotype in K; *E. boniana*: *Bon 4333*, lectotype and isotypes in P.

Distr. China (Hongkong, Kwangtung, Hainan), Indo-China (Tonkin).

I cannot agree with How, who considers the Hainan specimens cited by Merrill to represent *E. laevigata* (neither the true *laevigata* = *E. glaucescens*, nor *E. schmidtii*). The specimens differ slightly from the other Chinese specimens by the shape of the apex of the leaves, but I do not believe that this is of specific value.

41. **Erycibe oligantha** Merr. & Chun, Sunyatsenia 5, 1940, p. 175; How, Sunyatsenia 6, 1946, p. 225. — *E. pallidifolia* Merr. & Chun ex Tanaka & Odashima, J. Soc. Trop. Agric. 10, 1938, p. 379, nomen; Masamune, Fl. Kainant., 1943, p. 272, nomen.

Types: *How 73077*, holotype in A, isotypes in BM, BO, G, P; paratypes *How 72543* (A, BM, G, P), *How 73260* (A, BM, P), *Liang 65192* (A).

Distr. Hainan.

42. **Erycibe paniculata** Roxb., Pl. Corom. 2, 1798, p. 31, t. 159; Poir., Encycl. Méth. Suppl. 2, 1811, p. 582; Roxb., Hort. Beng., 1814, p. 16; Roxb., Fl. Ind. (ed. Carey & Wall.) 2, 1824, p. 284; Wall., Cat., 1828, no 1330; Roxb., Fl. Ind. (ed. Carey) 1, 1832, p. 585; Choisy, Ann. Sc. Nat. Sér. 2, 1, 1834, p. 222; G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; Grah., Cat. Pl. Bomb. & Vicin., 1839, p. 137; DC., Prod. 9, 1845, p. 464; Voigt, Hort. Suburb. Calc., 1845, p. 441; Wight, Ill. Ind. Bot. 2, 1850, p. 226, t. 180; Dalz. & Gibs., Bomb. Fl., 1861, p. 169; Thwaites, En. Pl. Zeyl., 1864, p. 213; Schnizl., Iconogr. 2, 1843—70, t. 144; Drury, Handb. Ind. Fl. 2, 1866, p. 323; Brandis, For. Fl. N.W. & C. India, 1874, p. 344; Clarke, Fl. Br. Ind. 4, 1883, p. 180 (excl. syn. *E. rheedii* Bl.); Watt, Dict. Econ. Prod. Ind. 3, 1890, p. 268; Talbot, Syst. List Bomb. Pres., 1894, p. 146; Trim., Handb. Fl. Ceyl., 3, 1895, p. 205; Gamble, Manual Ind. Timb. 2nd ed., 1902, p. 505; Talbot, Trees Shrubs Woody Climbers Bombay Pres. 2nd ed., 1902, p. 247; Prain, Bengal Pl., 1903, p. 724; Cooke, Fl. Pres. Bomb. 2, 1905, p. 225; Brandis, Indian Trees, 1906, p. 483; Duthie, Fl. Upp. Gang. Pl. 2, 1911, p. 101; Kirtikar, Basu, & An, Ind. Med. Pl., 2nd ed., 1918, p. 1704, t. 654 A; Haines, Bot. Bihar & Orissa 4, 1922,

p. 605; Gamble, Fl. Pres. Madras 5, 1923, p. 930; Alston, Handb. Fl. Ceyl. 6 (Suppl.), 1931, p. 201; Clarke in Kanjilal, Das, Kanjilal, & De, Fl. Assam 3, 1939, p. 360. — *Érima-tály* Rheede, Hort. Malab. 7, 1688, p. 73, t. 39; Lam., Dict. 2, 1786, p. 385. — *Catonia glauca* Vahl, Skrivt. Nat. Hist. Selsk. Kiøbenh. 6, 1810, p. 99. — *C. elliptica* Vahl, Skrivt. Nat. Hist. Selsk. Kiøbenh. 6, 1810, p. 101. — *Erimatalia rheedii* Roem. & Schult., Syst. Veg. 5, 1819, p. 331. — *Erycibe wightiana* Grah., Cat. Pl. Bomb. & Vicin., 1839, p. 137; Dalz. & Gibs., Bomb. Fl., 1861, p. 170; Drury, Handb. Ind. Fl. 2, 1866, p. 324; Brandis, Indian Trees, 1906, p. 483; Gamble, Fl. Pres. Madras 5, 1923, p. 930. — *E. paniculata* var. *wightiana* (Grah.) Clarke, Fl. Br. Ind. 4, 1883, p. 180; Woodrow, J. Bomb. Nat. Hist. Soc. 12, 1898, p. 170; Cooke, Fl. Pres. Bomb. 2, 1905, p. 225. — *E. albiflora* Hallier f., Bull. Herb. Boiss. 5, 1897, p. 1052; Prain, J. As. Soc. Beng. 73, II, 1904, p. 14; Brandis, Indian Trees, 1906, p. 714; Clarke in Kanjilal, Das, Kanjilal, & De, Fl. Assam 3, 1939, p. 361.

Types: *E. paniculata*: *Roxburgh 68,* lectotype in BR; *Catonia glauca*: *König s.n.,* lectotype and isotypes in C; *C. elliptica*: collector unknown, lectotype and isotype in C; *Erimatalia rheedii*: Rheede, l. c. t. 39; *Erycibe wightiana*: *Graham s.n.* unknown to me; *E. albiflora*: I leave the indication of a lectotype to future authors on *Erycibe* in India, best to be selected from material seen by Hallier f. (B, G, L).

Distr. Ceylon, India, and Pakistan, not W. of Bombay.

I have studied a number of specimens from the Indian peninsula, considered to represent partly *E. paniculata* s.s., partly *E. wightiana*. I have not been able to find a good difference to separate the two species in the herbarium, and I have therefore considered them to be identical. *Catonia glauca*, however, from Ceylon is slightly different and may represent a good species, for which the epithet shall then have to be transferred to *Erycibe*. I have not studied these specimens sufficiently to decide this matter. The epithet *elliptica* from *Catonia elliptica* may have to be used if *E. wightiana* is considered a good species.

Erycibe albiflora was named by Hallier f. for "*E. laevigata* Prain non Wall.". The specimens in the herbaria which I have seen under this name, named by Hallier f., do not look to me specifically different from *E. paniculata* Roxb. and certainly do not represent *E. laevigata* Prain non Wall. = *E.* cf. *schmidtii* Craib. Some had been labeled "*E. laevigata* Wall.".

In Wight's figure (1850) the structure of the stigma is given about as it is in *E. sapotacea* Prain (cf. Flora Malesiana). I have not found this structure in any of the specimens from Peninsular India I have studied.

43. Erycibe papuana Wernh., Trans. Linn. Soc. Bot. 9, 1916, p. 118; Hoogl., Fl. Mal. I, 4, 1953, p. 422.

Type: *Kloss s.n.,* holotype in BM.

Distr. New Guinea.

44. Erycibe pedicellata Ridl. ex Hoogl., Blumea 7, 1953, p. 315; Hoogl., Fl. Mal. I, 4, 1953, p. 410.

Types: *Beccari P.B. 3271,* Marop, Batang-Lupar, Sarawak, IV. 1867, holotype in K, isotypes in FI, G, P.

Distr. Borneo (Sarawak).

45. Erycibe peguensis (Clarke) Prain, J. As. Soc. Beng. 63, II, 1894, p. 83; Prain, Bengal Pl., 1903, p. 724; Brandis, Indian Trees, 1906, p. 483; Clarke in Kanjilal, Das, Kanjilal, & De, Fl. Assam 3, 1939, p. 362. — *E. expansa* Wall. [Cat., 1828, no 1331, p.p.] ex G. Don, Gen. Hist. Dichl. Pl. 4, 1837, p. 392, p.p., lectotypo excluso. — *E. paniculata* var.; Kurz, J. As. Soc. Beng. 45, II, 1876, p. 141. - *E. paniculata* Auct. non Roxb.; Kurz, For. Fl. Br. Burma 2, 1877, p. 213; Parkinson, For. Fl. Andam. Isls, 1923, p. 212; Kerr, Fl. Siam. En. 3, 1951, p. 97. — *E. paniculata* var. *peguensis* Clarke, Fl. Br. Ind. 4, 1883, p. 180.

Types: *E. paniculata* var. *peguensis*: *Griffith 686* (distr. *5885*), lectotype in K, isotypes in B, P; paratypes: *Falconer s.n.* (not seen), *Hooker & Thomson s.n.* (B, P), *Parish s.n.* (not seen).

Distr. Assam, Bengal, Burma, Andaman and Nicobar Islands.

46. Erycibe praecipua Prain, J. As. Soc. Beng. 63, II, 1894, p. 86; Prain, J. As. Soc. Beng. 74, II, 1906, p. 294; Ridl., Fl. Mal. Pen. 2, 1923, p. 447; Burk. & Henders., Gard. Bull. S. S. 3, 1925, p. 400; Hoogl., Fl. Mal. I, 4, 1953, p. 409, f. 12 a—b.

Types: *Curtis 911,* collected VII. 1886, lectotype in CAL, isotypes in K, L, SING; paratypes: *Curtis 911,* collected 1890 (E), *Curtis 1273* (K, SING), *Curtis = 1273* (K, SING).

Ssp. **praecipua.**

Distr. Malay Peninsula.

Ssp. **borneensis** Hoogl., Blumea 7 (1953) p. 315; Hoogl., Fl. Mal. I, 4, 1953, p. 410, f. 12 c.

Types: *Clemens 50087,* ridge E of Dahobang River, Penibukan, Kinabalu, British North Borneo, 1200 m, 2. XI. 1933, holotype in L, isotypes in A, BM, G, K, UC.

Distr. Borneo (Kinabalu).

The Bornean collection differs from the Malayan ones by the distinctly larger leaves and the much laxer inflorescences. Because of its geographical isolation I have given it subspecific rank.

47. Erycibe puberula Hoogl., Blumea 7, 1953, p. 316; Hoogl., Fl. Mal. I, 4, 1953, p. 429.

Types: *Meyer Drees 497,* Bernhard Bivouac, North New Guinea, alt. 50 m, 3. VIII. 1938, holotype and isotypes in BO; paratype *Brass 12803,* 6 km SW of Bernhard Camp, Idenburgh River, North New Guinea, alt. 1200 m, II. 1939 (A, L).

48. Erycibe ramiflora Hallier f., Ann. Jard. Bot. Btzg 14, 1897, p. 352; Hallier f., Bull. Herb. Boiss. 5, 1897, p. 743; Dakkus, Bull. Jard. Bot. Btzg Suppl. 1, 1930, p. 131; Hoogl., Fl. Mal. I, 4, 1953, p. 413, f. 14—15. — *E. cauliflora* Hallier f. ex Costerus & J. J. Sm., Ann. Jard. Bot. Btzg 19, II, 4, 1904, p. 160, t. 23, f. 68, sphalm. (teratology).

Types: *Hallier C 21c,* lectotype in L, isotypes in L, G; paratype: *Teysmann HB 3692* (not seen), cultivated in Hortus Bogoriensis (BO, G, L).

Distr. Sumatra.

49. Erycibe ramosii Hoogl., Blumea 7, 1953, p. 316; Hoogl., Fl. Mal. I, 4, 1953, p. 419.

Types: *Ramos BS 15096,* San Antonio, Laguna Prov., Luzon, VI. 1912, holotype in K; paratypes: *Alvarez FB 12973,* Bataan Prov., Luzon, XII. 1909 (K), *Mabesa FB 26910,* Los Banos, Laguna Prov., Luzon, VIII—IX. 1917 (A, BM, K, NY, P), *Wenzel 1100,* Leyte, 9. IX. 1914 (A, BM, G).

Distr. Philippines.

A yet little known species, the holotype collection being the only one in flower. By its distinctly rimose branches, by a (in the herbarium) different colour of the leaves, and by a different shape of the latter not difficult to distinguish from *E. terminaliflora* Elm.

50. **Erycibe rheedii** Bl., Bijdr. 16, 1826, p. 1047; G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; Koord., Exk. Fl. Java 3, 1912, p. 115; Koord. & Val., Bijdr. 13 Booms. Java, 1914, p. 33; Van Ooststr. in Back., Bekn. Fl. Java (nooduitg.) 8, 1949, fam. 191, p. 9; Hoogl., Fl. Mal. I, 4, 1953, p. 425. — *E. paniculata* Auct. non Roxb.; Miq., Fl. Ind. Bat. 2, 1856, p. 1032 et Suppl. 1, 1860, p. 248, 578. — *E. angulata* Prain, J. As. Soc. Beng. 63, II, 1894, p. 84; Prain, J. As. Soc. Beng. 74, II, 1906, p. 291; Ridl., Fl. Mal. Pen. 2, 1923, p. 448; Henders., Gard. Bull. S. S. 4, 1928, p. 292; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 943.

Types: *E. rheedii*: *Blume 648*, lectotype in L; paratypes *Blume s.n.* (L, P, U); *E. angulata*: *Kunstler 7379*, lectotype in CAL, isotypes in B, BM, G, K, L, P, SING; paratypes *Kurz s.n.* (not seen), *Scortechini 1816* (K, SING), *Teysmann HB 3682* (BO, U).

Distr. Sumatra, Malay Peninsula, Java, Borneo.

51. **Erycibe sapotacea** Hallier f. & Prain ex Prain, J. As. Soc. Beng. 73, II, 1904, p. 16; Prain, J. As. Soc. Beng. 74, II, 1906, p. 293; Ridl., Fl. Mal. Pen. 2, 1923, p. 447; Hoogl., Fl. Mal. I, 4, 1953, p. 409, f. 11.

Types: *Curtis 772*, holotype in CAL, isotypes and paratypes in CAL, K, P, SING.

Distr. Malay Peninsula (Penang).

The species was originally described on fruits only. In some specimens of *Curtis 772* (which consists of more than one collection, all from the locality) there are flowers.

52. **Erycibe sargentii** Merr., Philip. J. Sc. Bot. 13, 1918, p. 56; Merr., En. Philip. Fl. Pl. 3, 1923, p. 359; Hoogl., Fl. Mal. I, 4, 1953, p. 413.

Types: *Williams 593*, lectotype and isotype in NY; paratypes: *Adduru 18* (A, K, MO, P), *Cuming 1071* (BM, FI, G, K), *Madarang s.n.* (not seen), *Otanes BS 17696* (L), *Williams 798* (NY).

Distr. Philippines.

53. **Erycibe schlechteri** Pilger, Bot. Jahrb. 59, 1924, p. 85; Hoogl., Fl. Mal. I, 4, 1953, p. 429.

Types: *Schlechter 20286*, holotype in B, isotypes in BR, K.

Distr. New Guinea.

54. **Erycibe schmidtii** Craib, Bot. Tidsskr. 32, 1916, p. 352; Kerr, Fl. Siam. En. 3, 1951, p. 98. — *E. laevigata* [Wall., Cat., 1828, no 1333, nomen, p.p.] Auct. non Wall. ex Choisy; Clarke, Fl. Br. Ind. 4, 1883, p. 181; Gamble, List Darjeeling Distr. Beng. 2nd ed., 1896, p. 58; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 506; Brandis, Indian Trees, 1906, p. 483, 714; Dunn, J. Linn. Soc. Bot. 39, 1911, p. 446; Gagnep. & Courch., Fl. Gén. Ind.-Ch. 4, 1915, p. 306; Clarke in Kanjilal, Das, Kanjilal, & De, Fl. Assam 3, 1939, p. 361. — *E. semipilosa* Gagnep., Not. Syst. 14, 1950, p. 28.

Types: *E. schmidtii*: *Schmidt 686b*, holotype in ?, isotype in K; *E. semipilosa*: *Poilane 6193*, lectotype and isotype in P.

Distr. Sikkim, Bengal, Assam, Burma, Siam, Indo-China, China (Yunnan).

The isotype present in the Kew herbarium is a bad fragmentary specimen. I am not quite sure that indeed the present species is thus properly named; it is possible that the species should be named *E. semipilosa*, and that *E. schmidtii* is a good species, different from the latter. The holotype is possibly in the Aberdeen herbarium; it is not in Copenhagen.

In the type of *E. semipilosa* the 2 outer sepals are glabrous outside, the 2 inner ones are hairy; not all sepals are glabrous as described by Gagnepain.

5. **Erycibe sericea** Hoogl., Blumea 7, 1953, p. 317; Hoogl., Fl. Mal. I, 4, 1953, p. 416.

Type: *Vidal 3361,* Malamaui Island, Philippines, holotype in K.

Distr. Malamaui Island (Philippines).

56. **Erycibe stapfiana** Prain, J. As. Soc. Beng. 58, II, 1894, p. 87; Brandis, Indian Trees, 1906, p. 484; Prain, J. As. Soc. Beng. 74, II, 1906, p. 293; Ridl., Fl. Mal. Pen 2, 1923, p. 448; Burk. & Henders., Gard. Bull. S. S., 3, 1925, p. 400; Henders., Gard. Bull. S. S. 4, 1927, p. 100; Hoogl., Fl. Mal. I, 4, 1953, p. 423.

Types: *Kunstler 4015,* lectotype in CAL, isotypes in K, SING; paratypes: *Kunstler 4115* (BM, E, P, SING), *Kunstler 7784* (BM, G, K, NY), *Parish s.n.* (not seen), *Scortechini 1793* (B, BM, G, K, L).

Distr. Malay Peninsula and (?) Peninsular Burma.

57. **Erycibe stenophylla** Hoogl., Blumea 7, 1953, p. 317; Hoogl., Fl. Mal. I, 4, 1953, p. 415, f. 16. — *E. longifolia* Becc., Nelle Foreste Borneo, 1902, p. 403, 524, f. 65, nomen.

Types: *Beccari P.B. 2832,* rapids of the Redjang River, Sarawak, IX. 1869, holotype in FI, isotypes in FI, G, K, L.

Distr. Borneo (Sarawak).

I have not retained Beccari's epithet *longifolia* to avoid difficulties with *E. glomerata* var. *longifolia* Bl.; Merrill (Bibl. En. Born. Pl., 1921, p. 507) cited *E. longifolia* Becc. as a synonym under this variety. As Beccari's publication of the new species was not accompanied by a description nor by a figure showing any analyses, I am free to give it a new name.

58. **Erycibe strigosa** Prain, J. As. Soc. Beng. 65, II, 1896, p. 536; Prain, J. As. Soc. Beng. 74, II, 1906, p. 288; Ridl., Fl. Mal. Pen. 2, 1923, p. 445; Burk. & Henders., Gard. Bull. S. S. 3, 1925, p. 400; Hoogl., Fl. Mal. I, 4, 1953, p. 416.

Types: *Kunstler 8461,* lectotype in CAL, isotypes in B, G, K, L, SING.

Distr. Malay Peninsula.

The species is known only from the type collection with very young buds only. It is strongly characterized by the long-strigose lower surface of the leaves.

59. **Erycibe subglabra** Scheff. ex Hoogl., Blumea 7, 1953, p. 317; Hoogl., Fl. Mal. I, 4, 1953, p. 430.

Types: *Kornassi 226,* Tandjong Perigi, Ceram, seashore, 17. X. 1917, holotype in L, isotypes in BO, U; paratypes: *Warburg 17300,* Amboina (B), Cultivated in Hortus Bogoriensis, from Amboina (BO, L, MICH).

Distr. Moluccas (Ceram and Amboina).

60. **Erycibe subsericea** Hoogl., Blumea 7, 1953, p. 318; Hoogl., Fl. Mal. I, 4, 1953, p. 416.

Types: *Kostermans 5116,* along Menubar River, E. Kutei, E. Borneo, 10 m, 10. VI. 1951, holotype in BO, isotypes to be distributed to Canberra, K, L.

Distr. East Borneo.

61. **Erycibe subspicata** Wall. [Cat., 1828, no 1332, nomen] ex G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; Clarke, Fl. Br. Ind. 4, 1883, p. 181; Prain, J. As. Soc. Beng. 63, II, 1894, p. 84; Brandis, Indian Trees, 1906, p. 483; Dunn, J. Linn. Soc. Bot. 39, 1911, p. 446; Clarke in Kanjilal, Das, Kanjilal, & De, Fl. Assam 3, 1939, p. 360; Merr., J. Arn. Arb. 23, 1942, p. 192; How, Sunyatsenia 6, 1946, p. 226; Kerr, Fl. Siam. En. 3, 1951, p. 98. — *E. paniculata* var. *subspicata* (Wall. ex G. Don) Choisy ex DC., Prod. 9, 1845, p. 464; Miq., Fl. Ind. Bat. 2, 1856, p. 1032.

Types: *Wallich 1332,* holotype in K, isotypes in B, G.

Distr. Bengal, Assam, Burma, Siam, Indo-China, China (Yunnan).

62. **Erycibe sumatrensis** Merr., Pap. Mich. Acad. Sc. Arts Lett. 19, 1934, p. 190; Hoogl., Fl. Mal. I, 4, 1953, p. 414.

Types: *Yates 2393,* holotype in NY (?), isotypes in A, BO, K, MICH, P.

Distr. Sumatra, once collected.

63. **Erycibe terminaliflora** Elm., Leafl. Philip. Bot. 5, 1913, p. 1768; Merr., En. Philip. Fl. Pl. 3, 1923, p. 359; Hoogl., Fl. Mal. I, 4, 1953, p. 418 — *E. hallieriana* Elm., Leafl. Philip. Bot. 7, 1915, p. 2601. — *E. pararan* Elm., Leafl. Philip. Bot. 7, 1915, p. 2603. — *E. copelandii* Elm., Leafl. Philip. Bot. 8, 1919, p. 3077. — *E. rheedii* Auct. non Bl.; Merr., En. Philip. Fl. Pl. 3, 1923, p. 358, p.p.

Types: *E. terminaliflora*: *Elmer 13221,* lectotype in L, isotypes in B, BM, BO, E, FI, G, K, MO, NY, U; *E. hallieriana*: *Elmer 10918,* lectotype in L, isotypes in A, B, BM, BO, E, FI, G, K, MO, NY, P; *E. pararan*: *Elmer 11270,* lectotype in L, isotypes in A, B, BM, BO, E, FI, G, K, MO, NY, P; *E. copelandii*: *Elmer 18001,* lectotype in L, isotypes in A, B, BM, BO, C, FI, G, K, MO, NY, P, UC.

Distr. Philippines.

Among the specimens cited by Merrill (l. c.) under *E. rheedii* are some belonging to *E. ramosii* Hoogl.

64. **Erycibe timorensis** Hallier f. ex Hoogl., Blumea 7, 1953, p. 318; Hoogl., Fl. Mal. I, 4, 1953, p. 423. — *E. rheedii* Auct. non Bl.; Spanoghe, Linnaea 15, 1841, p. 325.

Types: *Spanoghe 43,* in the mountains of Timor, holotype in L, isotype in P; paratypes: *Zippelius s.n.,* Timor (L), *Zippelius 43,* Timor (L), Timor (L).

Distr. Timor.

65. **Erycibe tomentosa** Bl., Bijdr. 16, 1826, p. 1048; G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; DC., Prod. 9, 1845, p. 464; Miq., Fl. Ind.

Bat. 2, 1859, p. 1033; Koord., Exk. Fl. Java 3, 1912, p. 115; Van Ooststr., in Back., Bekn. Fl. Java (nooduitg.) 8, 1949, fam. 191, p. 8; Hoogl., Fl. Mal. I, 4, 1953, p. 426, f. 18. — *E. princii* Wall. [Cat., 1828, no 1335, nomen: *princei*] ex Choisy, Ann. Sc. Nat. Sér. 2, 1, 1834, p. 223; G. Don, Gen. Hist. Dichl. Pl. 4, 1838, p. 392; DC., Prod. 9, 1845, p. 464; Miq., Fl. Ind. Bat. 2, 1859, p. 1033; Clarke, Fl. Br. Ind. 4, 1883, p. 182; Prain, J. As. Soc. Beng. 63, II, 1894, p. 85; Prain, J. As. Soc. Beng. 74, II, 1906, p. 290; Hallier f., Bot. Jahrb. 49, 1913, p. 376; Merr., Bibl. En. Born. Pl., 1921, p. 508; Merr., En. Philip. Fl. Pl. 3, 1923, p. 358; Ridl., Fl. Mal. Pen. 2, 1923, p. 446; Moore, J. of Bot. 62, 1924, Suppl. p. 71; Merr., Univ. Calif. Publ. Bot. 15, 1929, p. 259; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 944; Masamune, En. Phan. Born., 1942, p. 633; Henders., Malayan Wild Flowers 2, 1950, p. 313. — *E. camptobotrya* Miq., Fl. Ind. Bat. Suppl., 1860, p. 248, 578; Kurz, Nat. Tijdschr. Ned. Ind. 27, 1864, p. 214. — *E. parvifolia* Hallier f., Bull. Herb. Boiss. 5, 1897, p. 739; Dakkus, Bull. Jard. Bot. Btzg Suppl. 1, 1930, p. 131. — *E. hirsuta* Hallier f., Bot. Jahrb. 49, 1913, p. 376; Merr., Bibl. En. Born. Pl., 1921, p. 508; Masamune, En. Phan. Born., 1942, p. 633. — *E. dolichotricha* Merr., Pap. Mich. Acad. Sc. Arts Lett. 19, 1934, p. 189.

Types: *E. tomentosa*: *Blume 1355*, lectotype and isotype in L; paratype *Blume* s.n. (BM, BO, L, P, U); *E. princii*: *Wallich 1335*, holotype in G, isotypes in B, K; *E. camptobotrya*: holotype *Teysmann HB 3347* in U; *E. hirsuta*: *Hub. Winkler 3337*, holotype in Hamburg, isotypes in B, BM, BO, K, L; *E. dolichotricha*: *Bartlett 6665*, holotype in NY (?), isotype in MICH; paratypes: *Bartlett 6700* (MICH, NY), *Bartlett 7088* (MICH, NY), *Yates 2253* (BO, MICH, NY, UC).

Var. **tomentosa**. — *E. tomentosa* Bl. — *E. princii* Wall. ex Choisy — *E. camptobotrya* Miq. — *E. parvifolia* Hallier f.

Distr. Sumatra, Malay Peninsula, Java, Borneo, Philippines (Leyte).

Var. **hirsuta** (Hallier f.) Hoogl., Fl. Mal. I, 4, 1953, p. 428. — *E. hirsuta* Hallier f. — *E. dolichotricha* Merr.

Distr. Sumatra, Malay Peninsula (Johore), Borneo.

66. **Erycibe zippelii** Hoogl., Blumea 7, 1953, p. 319; Hoogl., Fl. Mal. I, 4, 1953, p. 431.

Types: *Zippelius 131*, holotype in L; paratype *Zippelius 110* (L).

Distr. New Guinea.

Species unknown to me and uncertain records.

67. **Erycibe sinii** How, Sunyatsenia 6, 1946, p. 226.

Type: Sin 594.

Distr. China (Kwangsi).

Judging from the description it is possible that the specimen represents *E. schmidtii* Craib ("*E. laevigata* Auct."; "*E. laevigata How*" is *E. obtusifolia* Benth.).

68. **Erycibe paniculata** Auct. non Roxb.; Kurz, Nat. Tijdschr. Ned. Ind. 27, 1864, p. 214.

As I have not seen the specimen cited (Batu-Rusak) I cannot decide about its identity. As *E. paniculata* is not known as far East as Banka, it is improbable that the identification is correct.

69. **Erycibe paniculata** var. **coccinea** an F. M. Bail.?; F. M. Bail., Queensl. Agric. J. 23, 1909, p. 219.

This is the only record of *E. coccinea* from New Guinea. As I have not seen the specimen cited (Mrs H. P. Schlencker, Boku) I am doubtful whether the identification is correct.

70. **Erycibe paniculata** an Roxb.?; Guill., Fl. Anal. Synopt. Nouv.-Caled., 1948, p. 302.

I have seen the specimen on which this record has been based: *Vieillard 107*, Port de France, 1855—60 (P). The specimen is in bud and insufficient for specific identification. On the label there is no indication that the species was cultivated, as stated by Guillaumin. It may be, indeed, *E. paniculata*. The locality (Port de France, near Nouméa) certainly does not make it probable that the genus is indigenous in New Caledonia, and Guillaumin's opinion that the collected plant is an introduction seems justified.

Excluded species and record.

Erycibe longipes Gagnep., Not. Syst. 3, 1915, p. 140; Gagnep. & Courch., Fl. Gén. Ind.-Ch. 4, 1915, p. 309, f. 36.

Types: *Pierre 857*, holotype in P, isotypes in A, K, P.

The type collection is a fruiting specimen, not belonging to *Erycibe* but to **Argyreia** Lour. I cannot judge whether the species has already been described in that genus.

Erycibe sp. Kanehira, J. Dept Agric. Kyushu Imp. Univ. 4, 1935, p. 398.

This is the only record of the genus from Micronesia. The collection cited (*Kanehira 1363*, Kusai) is present in the New York herbarium. It is not Erycibe, but probably belongs to **Embelia** (Myrsinaceae).

Erycibe ? integripetala Merr. & Chun, Sunyatsenia 5, 1940, p. 174.

Types: *How 72839*, holotype in A, isotypes in BM, BO, G, P; paratypes *How 72788* (A, BM, BO, G, P).

As already noted by How (Sunyatsenia 6, 1946, p. 230) the species does not belong to *Erycibe*, but is synonymous for **Neuropeltis racemosa** Wall. Dr Van Ooststroom was so kind to study the specimens for me and confirmed this statement.

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SOME ANNOTATIONS TO THE COMPOSITAE COLLECTED BY O. BECCARI IN BORNEO AND SUMATRA

by

JOSEPHINE TH. KOSTER
(Rijksherbarium, Leiden)

(Issued 18. XII. 1953)

The *Compositae* of the Malay Archipelago and New Guinea collected by O. Beccari have been studied by U. Martelli in 1883. Afterwards J. Mattfeld reconsidered some of Beccari's *Compositae*, chiefly specimens of the genus *Blumea*, founding also a new species, *Anaphalis arfakensis*, on a Beccari specimen from Papua.

The re-examination of the above mentioned collection brought to light some misinterpretations.

1. The Bornean plant identified by Martelli as *Spilanthes urens* Jacq. does not belong to that tropical American species, but it is the endemic Bornean species *Spilanthes chamaecaula* A. H. Moore. In his revision of the genus *Spilanthes*, Moore distinguished the two species which are very similar in their habit, but clearly distinct in their achenes. In his annotations Martelli indicates that Beccari found the Bornean species growing in great quantities on the beach which gave him the impression that the plant had already been introduced for a long time. Martelli's remark about the astonishing geographical distribution of *Spilanthes urens* is explained now in so far as there is no question of one and the same species: there are two different ones.

This is the second record of the Bornean *Spilanthes*.

2. The Sumatran specimen identified as *Erechtites petiolata* Benth. appears to be *Erechtites valerianifolia* (Wolf) DC., a species from Brasil and introduced into Java in 1845. It has since spread all over the Malay Archipelago. Martelli followed Hooker's identification, though Martelli himself found very little difference between the Beccari plant and a specimen of *Erechtites valerianifolia* from Brasil which he checked with it.

3. *Lactuca kanitziana* Martelli from Borneo is identical to *Youngia japonica* (L.) DC. [= *Crepis japonica* (L.) Benth.] which is introduced all over the Malay Archipelago. Martelli thought already that the Beccari plant was introduced from China or another part of the Asiatic continent. But he himself, as well as Kanitz who also studied the plant, presumed it to be a new species, according to Martelli's annotations.

References.

MARTELLI, U. — Le Composte raccolte dal Dottor O. Beccari nell' Arcipelago Malese e nella Papuasia — Nuovo Giorn. Ital. 15, 1883, 281—305.

MATTFELD, J. — Die Compositen von Papuasien — Engl. Bot. Jahrb. 62, 1928, 386—451.

MOORE, A. H. — Revision of the genus Spilanthes — Contrib. Gray Herb. Harv. Univ. N. S. 33, 1907, 521—569; Proceed. Amer. Acad. Arts and Sci. 42, 1907.

REVISION OF THE SAPOTACEAE OF THE MALAYSIAN AREA IN A WIDER SENSE

IV [1]). Ganua Pierre ex Dubard

by

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(Leiden)

(Issued 18. XII. 1953)

GENERAL PART.

1. Historical notes.

Within the Sapotaceae, the tribe of the *Madhuceae* presents a very homogeneous group. One point of view is to consider it a single polymorphous genus. The opposite opinion was expressed by Pierre, who distinguished a number of small genera, many on futile characters. Amongst those which stood later criticism is the genus *Ganua* which was, however, not published by Pierre but by Dubard (1907, 1908a, 201 and 1908b, 407), who adopted Pierre's Ms names and made use of his extensive annotations.

The name *Ganua* is derived from the word ganu, the native name for latex produced by a tree, "used for falsifying the valuable products of 'gutta terbu' " (f. Errington de la Croix in schedula; cf p. 389).

Dubard (1908a, 201) describes *Ganua* as a genus whose most important features are the very low inserted ovules and the imperfectly closed cells of the conoidal ovary, the partitions of which ascend into the style like internal wings, thus leaving a central cavity above the placenta: "...... ce qui caractérise le mieux ce genre, c'est l'ovaire claviforme en continuité avec la base du style, les ovules sont insérés très bas et les cloisons séparatrices des loges sont libres au dessus de cette insertion, au lieu de confluer vers un axe central".

Among other important features given by Dubard (l. c.) are the thin pericarp, and the nervation of the leaves. Two more or less easily distinguishable, though unnamed, groups were mentioned by him in this respect: one with slender and fairly crowded nerves, transversal nervation, if any, hardly distinguishable, thus approaching the type of *Payena*; the other group with a wider and more prominent nervation, the minor nerves more distinctly transversal as in the section *Dasyaulus* of *Madhuca.*

The following species were recognised as *Ganuas* in the first publication on the genus (Dubard 1908b, 407): *G. chrysocarpa* Pierre ex Dubard

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[1]) I—III in Blumea VI, 3, 1952, pp. 547—595.

(now *G. curtisii* [K. & G.] H. J. L.); *G. coriacea* Pierre ex Dubard; *G. motleyana* (de Vriese) Pierre ex Dubard; *G. rubiginosa* Pierre ex Dubard (now *G. fusca* [Engler] Merrill); *G. beccarii* Pierre ex Dubard; *G. sarawakensis* Pierre ex Dubard; *G. prolixa* Pierre ex Dubard; *G. boerlageana* (Burck) Pierre ex Dubard.

The three first mentioned species show a nervation like *Payena*, the others that of *Dasyaulus*.

Some extension to the genus was given by Lam who in his first study on Malaysian Sapotaceae (Lam 1925, 118) added the following species: *G. sessilis* (K. & G.) H. J. Lam; *G. scortechinii* (K. & G.) H. J. Lam (now *G. motleyana* [De Vriese] Pierre ex Dubard); *G. pallida* (Burck) H. J. Lam.

Later on, Lam (1927, 424) added two more species: *G. glaberrima* (H. J. L.) H. J. L. (now *G. kingiana* [Brace] Van den Assem) and the incompletely known *G. ligulata* H. J. L. (now *Madhuca ligulata* [H. J. L.] H. J. L.).

The publications of Dubard and Lam referred to in the present paper are abbreviated as follows:

Dubard 1907 = M. Dubard, Sur la délimitation et les relations des principaux genres d'Illipéées — C. R. A. S. 1907, 1058.
Dubard 1908a = M. Dubard, Les Sapotacées du groupe des Illipéées — Rev. Gén. Bot. XX 1908, 201.
Dubard 1908b = M. Dubard, Description de quelques types nouveaux ou peu connus de Sapotacées (Illipéées), d'après les documents de L. Pierre — Bull. Mus. Hist. Nat. XIV, 1908, 407.
Lam 1925 = H. J. Lam, The Sapotaceae, Sarcospermaceae and Boerlagellaceae of the Dutch East Indies and surrounding countries — Bull. Jard. bot. Buitenz., Sér. III, VII, 1925, 118.
Lam 1927 = H. J. Lam, Further studies on Malayan Sapotaceae I — Bull. Jard. bot. Buitenz., Sér. III, VIII, 1927, 424.
Lam 1945 = H. J. Lam, Notes on the historical phytogeography of Celebes — Blumea V, 3, 1945, 600.

2. Morphology and delimitation of the genus.

The combination of characters which together mark the genus *Ganua* as recognised by us, makes in general the genus pretty well distinguishable from other *Madhuceae*, though each of the characters shows a gradual transition to situations realised in other genera. The originally most stressed *Ganua* character, the often glabrous, conoidal ovary with the ovules inserted low in imperfectly closed cells, is not a constant one. The central cavity above the placenta can be larger or smaller and, moreover, the cavity tends to become larger with the age of the flower; in some species, such as *G. kingiana* and *G. curtisii*, the variability in this character within the species can be so wide that the ovary cells can even be completely closed and the central cavity wanting, a condition normally found in all other *Madhuceae*.

In the number of flower parts *Ganua* and *Madhuca* resemble each other. *Ganua* generally has 7—8 corolla lobes, in *G. kingiana* and *G. pierrei* up to 12; *Madhuca* has 8—12. The stamens in *Ganua* are generally 16, in *G. motleyana* and *G. curtisii* up to 22, in *G. pierrei* up to 24, in *G. kingiana* according to the original description by King and

Gamble up to 36. In *Madhuca* the number of stamens varies (according to literature) between 16 and 40. Of several *Ganua* species, however, corolla and stamens are unknown.

A reasonably good and easily recognisable *Ganua* character, represented in most of the species, is the rather distinct tuft of hairs at the apices of the calyx lobes. The pericarp which in Ganua is thin, dry and woody, together with the shape and nature of the seeds, are other important features. In *Madhuca* the pericarp is much thicker, a transition being found in *G. kingiana*; in addition, the fruit of that species has generally more cells than is the average in the genus. The seeds of *Ganua* have a very thin testa, a linear scar, a membranous or thin albumen and thick cotyledons; *Madhuca* is in this respect rather like *Ganua*. Unfortunately the fruits and seeds of several *Ganua* species are yet unknown.

Leaf characters like shape, thickness etc. are rather variable. In the nervation, however, a more constant character is to be found, useful also for distinguishing certain groups of species (see underneath). There is a type recalling that of *Payena* sect. *Ganuopsis*, another that of *Madhuca* sect. *Dasyaulus*. At least one *Ganua* species (*G. pachyphylla*) shows a resemblance to the nervation type found in *Burckella*.

Several *Ganua* species show a very distinct terminal bud with conspicuous large scales. Laterally the scales may possess stipular organs as are found in some of the uppermost leaves. Bud scales of such a size are, so far as we are aware, not known in other genera of the *Madhuceae*. Generally the stipules are caducous.

Summarising we may state that *Ganua* is distinguished by the following set of characters: terminal vegetative bud often with conspicuous bud scales, often with stipules; tertiary nervation mostly longitudinal; sepals mostly with distinct dark hair tufts; ovary gradually contracted into the hollow style, septa almost always imperfect, leaving the basal placenta free; pericarp thin and dry; testa of seeds thin, scar linear; albumen membranous.

For full generic description, see p. 369.

3. **Distribution of the genus** (cf. *Fig. 1*).

Ganua is known to be represented in the following areas: Sumatra, Malay Peninsula, Riau, Banka, Belitong, Borneo, Palawan, Luzon, Moluccas and New Guinea. From the Sumatran west coast, which differs geologically from the older and much lower east coast, only one doubtful specimen is known (*G. motleyana*).

The genus is apparently of Western origin, having its greatest diversity in the western parts of the archipelago, notably in western Borneo (Sarawak), but it is not limited to the Sunda-shelf. The genus was already known from the Moluccas; new localities prove it to be also represented in New Guinea. Remarkable is the gap of Celebes in the list of localities. Maybe his condition is due to imperfect knowledge, the alternative possibility being that *Ganua* reached the eastern parts of the archipelago via a migration track from North Borneo through the Philippines and the Moluccas (cf. Lam 1945, 600).

The possibility of a bi- or polyphyletic origin of the genus in the sense that the western species and the eastern ones should be convergent, seems doubtful, since there is, in my opinion, a rather distinct relationship between *G. orientalis* (New Guinea), *G. boerlageana* (New Guinea, Moluccas), *G. monticola* (Palawan), *G. beccarii* (Sarawak) and *G. sessilis* (Borneo, Belitong, Malay Pen.).

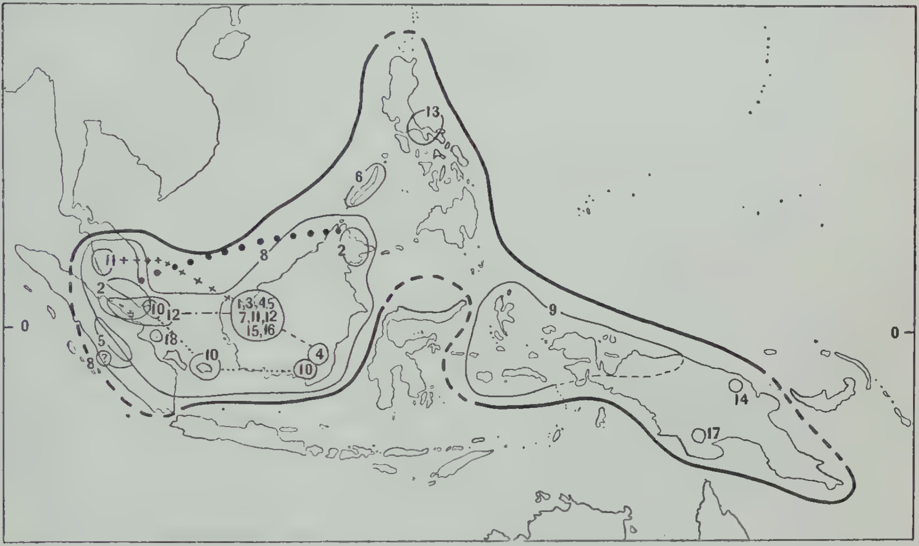


Fig. 1. Areas of *Ganua* species — 1. *fusca*; 2. *kingiana*; 3. *prolixa*; 4. *sarawakensis*; 5. *pallida*; 6. *monticola*; 7. *beccarii*; 8. *motleyana*; 9. *boerlageana*; 10. *sessilis*; 11. *curtisii*; 12. *coriacea*; 13. *obovatifolia*; 14. *pachyphylla*; 15. *pierrei*; 16. *daemonica*; 17. *orientalis*; 18. *nov. spec.* ?

4. Delimitations and interrelationships of the species.

Floral characters being rather uniform in the genus, these are next to useless regarding relationships inside the genus. More valuable seem several vegetative characters e. g. the proportion of length and width of the adult leaves and the characters of the petioles whose variability seems, in most species, slight.

The general arrangement of the leaves in relation to that of the inflorescences, however, seems of some importance. Concerning this point two types are discernible: one type with leaves and inflorescences more or less regularly dispersed along the branchlets, most inflorescences being inserted in the axils of leaves (*G. beccarii, boerlageana, coriacea, curtisii, motleyana, orientalis, pachyphylla, prolixa* [at tips of branchlets], *sessilis*); and one type in which the leaves are apically conferted, the inflorescences being inserted in a lower, distinctly separated area and mostly close together (*G. fusca, kingiana, monticola, obovatifolia, pallida, pierrei, sarawakensis*). Transitions are found in *G. curtisii* and *G. motleyana* and more or less in *G. daemonica.* However, not of all species flowering branchlets have been examined.

The nature of nervation of the leaves procures, in my opinion, several characters indicating a possible relationship, as was already pointed out by Dubard (1908a, 201). However, not only the tertiary nervation, to which Dubard exclusively refers is of some importance, also the type and degree of prominency of the midrib on either side of the leaf, the petiole, and the course, the prominency and the mutual marginal connections of the secondary nerves are more or less useful characters. Regarding these, three groupes are more or less distinctly discernible:

A. There is a very distinct difference in prominency of the midrib above and below: above nearly flat or impressed, below very prominent. The secondary nerves are generally archingly joined near the margin. Between the secondary nerves smaller nerves start from the midrib almost parallel to them, but they are soon curved downwards and show a tendency to become transversal; this is most distinct in *G. kingiana* var. *euphlebia.* The leaves and inflorescences are arranged in separate regions, the leaves being mostly oblong to obovate, longer than three times their width, more or less distinctly petioled and frequently more or less crowded at apex. Except *G. pierrei* all representatives of this group show a distinct terminal bud with conspicuous bud scales which often possess stipules as do some of the highest leaves. Representatives of this group are *G. fusca* (Sarawak); *G. kingiana* (Sumatra, Malay Pen., Borneo); *G. monticola* (Palawan); *G. pallida* (Sumatra); *G. pierrei* (Sarawak); *G. prolixa* (Sarawak); *G. sarawakensis* (Sumatra, Sarawak).

B. The difference in prominency of the midrib on either side of the leaf is slight, the midrib being little or moderately prominent both above and below. The secondary nerves run straight up to the margin where they are distinctly archingly joined. The tertiary nerves are distinctly parallel to the secondary ones (most so in *G. daemonica*) and reticulate close near the margin. To this group belong: *G. coriacea* (Sumatra, Riau, Borneo); *G. curtisii* (Malay Pen., Borneo); *G. daemonica* (Sarawak); *G. motleyana* (Sumatra, Malay Pen., Riau, Banka, Belitong, Borneo).

C. As in B, there is no distinct difference in prominency of the midrib below and above, the midrib being little prominent on either side. The secondary nerves are prominulous on either side, sometimes flattened above, joined near the margin but never by a continuous intramarginal nerve. One or few tertiary nerves start about parallel to the adjoining secondary ones but they are soon curved downwards, though never tending to become transversal. There is a reticulate nervation all over the leaf which can be very dense (*G. beccarii*) to very loose (*G. boerlageana*). Leaves and inflorescences are inserted in the axils of leaves; flowers, as far as known, are rather small. Representatives are: *G. beccarii* (Sarawak); *G. boerlageana* (Moluccas, New Guinea); *G. monticola* (Palawan), cf. sub A; *G. orientalis* (New Guinea); *G. sessilis* (Malay Pen., Belitong, Borneo). Maybe *G. pierrei* (Sarawak) also belongs to this group on account of its nervation which is not very clearly transversal; it also shows a loose reticulation all over the leaf (cf. sub A).

The position of *G. pachyphylla* and *G. obovatifolia* is not clear. In both species the tertiary nervation is little conspicuous and the midrib is little prominent on either side. Though *G. obovatifolia* shows a striking resemblance with *G. coriacea* in shape of the leaves, there is no relation in more important features.

TAXONOMIC PART.

For the present revision material was available from the following herbaria:

Bogor, Herbarium Bogoriense, Kebun Raya Indonesia (BO)
Jamaica Plain (Mass.), Arnold Arboretum of Harvard University (A)
Kepong, Forest Research Institute (KEP)
Kew, Herbarium Royal Botanic Gardens (K)
Leiden, Rijksherbarium (L)
London, British Museum (Natural History) (BM)
New York, New York Botanical Garden (NY)
Paris, Musée National d'Histoire Naturelle, Phanérogamie (P)
Sydney, National Herbarium of New South Wales (NSW)
Singapore, Botanic Gardens (SING)
Stockholm, Naturhistoriska Riksmuseet (S)
Wien, Naturhistorisches Museum (W)

It is my pleasant duty to tender my best thanks to the directors of these institutes for their valuable co-operation.

In quoting literature and synonyms we have mostly restricted ourselves to new facts and opinions, referring to earlier sources for full information. The same is true regarding descriptions, but all specimens examined have been cited. Descriptions of species were added if previous ones were incomplete.

Some frequent abbreviations are:

FD = Forest Department Singapore.
NIFS = Netherlands Indian Forestry Service.

Ganua Pierre ex Dubard, Rev. Gén. Bot. XX, 1908, 201; Lam 1925, 118; Lam 1927, 424.

Type species: *G. curtisii* (K. & G.) H. J. L.

Several *Ganua* species were originally described under *Bassia* L., *Burckella* Pierre, *Dasyaulus* Thw., *Illipe* Koen., *Isonandra* Wight, *Madhuca* Gmelin and *Payena* DC.

Trees with latex; *stipules* almost always caducous, sometimes still found at base of uppermost leaves and laterally in scales of terminal buds; *leaves* mostly glabrous (in one species only [*G. fusca*] densely tomentose below); secondary nerves ascending from midrib, mostly archingly joined near margin; tertiary nerves ascending from midrib, as strong as or more slender than secondary ones, starting more or less parallel to secondary ones, in some species up to margin, in others soon curved downwards and sometimes becoming more or less distinctly transversal; *inflorescences* fasciculate, in axils or leaves or their scars, dispersed along branchlets between leaves or more or less limited to a leafless lower part of branchlet; *sepals* 4, biseriate, apex almost always tufted by some dark and stiff hairs; *corolla* usually not or little exsert, lobes 7—8(—12), glabrous except for apices, tube more or less cylindrical or funnel-shaped, rather narrow, glabrous without, throat sometimes densely villous; *stamens* 16—20(—24), in 2 rows which are close together, filaments usually short, anthers ovate to oblong, mucronate at apex; *style* long exsert in open flower, hollow; *ovary* mostly glabrous, sometimes pubescent, conoidal, gradually contracted into style, cells 5—8(—12), almost always imperfect from immediately above placenta, the partitions rising as internal wings into the style canal; *fruits* with persistent, not or little enlarged, style and calyx, glabrous or pubescent, 1—few-seeded, sometimes more or less furrowed (*G. kingiana*), pericarp always thin and dry, septa imperfect (as far as known; closed cells sometimes in *G. kingiana* and *G. curtisii*), testa of seeds very thin, scar linear, hilum apical; albumen membranous, somewhat more substantial around the radicle only, cotyledons thick; radicle exsert, usually cylindrical and long.

17 or 18 species in the Malay archipelago from Sumatra to the Philippines and New Guinea. Not known from Java, the Lesser Sunda Islands and Celebes.

Key to the species.

1a. Leaves densely ferruginously tomentose below (*Borneo*). **1. G. fusca** (Engler) Merrill
b. Leaves glabrous below 2
2a. Leaves 3 or more times longer than wide 3
b. Leaves up to 3 times longer than wide 10
3a. Midrib very prominent below, at upper side flat or hardly prominent; leaves mostly crowded at apex of branchlets 4
b. Midrib up to moderately prominent below, never showing a clear difference in prominency at the two sides; leaves dispersed along branchlets or limited to apical part but never crowded there 8
4a. Secondary nerves slightly impressed above, prominulous below, distinctly archingly joined; tertiary nerves mostly transversal, particularly near margin; pedicels pubescent and rather stout (*Sumatra, Malay Pen., Borneo*). **2. G. kingiana** (Brace) Van den Assem
b. Secondary nerves little but unmistakeably prominulous on either side, never a distinct intramarginal nerve; tertiary nerves more or less parallel to secondary ones, particularly near midrib, reticulate near margin 5
5a. Petioles longer than 4 cm, rough at base, at apex above flat with two faint lines descending from midrib; pedicels densely yellowish-grey tomentose (*Borneo*). **3. G. prolixa** Pierre ex Dubard
b. Petioles shorter than 4 cm, in some cases rough at base, never with faint lines above, pedicels glabrous 6
6a. Midrib distinctly impressed above; petioles broadly canaliculate above, 1.6—1.8 cm long; secondary nerves 10—16, not quite distinctly archingly joined near margin (*Borneo*). . . . . **4. G. sarawakensis** Pierre ex Dubard
b. Midrib flat or slightly prominent above; petioles flat or slightly convex near apex above, up to 1.6 cm long; secondary nerves 9—18 7
7a. Secondary nerves up to 12; leaves nearly sessile; petioles shorter than 1 cm (*Sumatra, Borneo*) . . . . **5. G. pallida** (Burck) H. J. Lam
b. Secondary nerves 12—18; leaves distinctly petiolate; petioles 1.2—1.6 cm long (*Palawan, Sibuyan?, Borneo?*) . . . . . **6. G. monticola** (Merrill) H. J. Lam
8a. Reticulate nervation the same all over the leaf; petioles narrowly winged in the upper part, rough at base and mostly ferruginously tomentose; pedicels glabrous; base of leaf long decurrent (*Borneo*). **7. G. beccarii** Pierre ex Dubard
b. Reticulate nervation not similar all over the leaf, most conspicuously so near margin; petioles not ferruginously tomentose; pedicels glabrous; base of leaf more or less decurrent 9

9a. Midrib on upper side with distinct median edge; tertiary nerves generally parallel to secondary ones which are distinctly archingly joined; no or little nervation outside the intramarginal nerve (*Sumatra, Malay Pen., Riau, Belitong, Borneo*) . . . . **8. G. motleyana** (de Vriese) Pierre ex Dubard

b. Midrib on upper side flat or slightly convex; tertiary nerves reticulate, not conspicuously parallel to secondary ones; there is no continuous intramarginal nerve joining the secondary ones; plenty of tertiary nervation outside joints (*Moluccas, New Guinea*) . . . . **9. G. boerlageana** (Burck) Pierre ex Dubard

10a. Leaf apex always distinctly rounded, sometimes emarginate 11

b. Leaf apex always more or less acute or acuminate 14

11a. Leaves fairly well sessile, petioles 0.2—0.5 cm long; secondary nerves 7—9 (*Malay Pen., Belitong, Borneo*) . . . . **10. G. sessilis** (K. & G.) H. J. Lam

b. Leaves distinctly petiolate; petioles 0.6—2.6 cm long; secondary nerves 8—18 12

12a. Petioles longer than 1.5 cm; secondary nerves 11—18; pedicels more or less pubescent (*Malay Pen., Borneo*) . . . . **11. G. curtisii** (K. & G.) H. J. Lam

b. Petioles up to 1.5 cm; secondary nerves 8—12; pedicels glabrous 13

13a. Tertiary nerves parallel to secondary ones; secondary nerves 9—12; petioles 0.6—1.1 cm long; leaves more or less scattered along branchlets, rather dark when dry, pedicels less than 0.7 cm long; sepals conspicuously broadly acuminate (*Sumatra, Riau, Borneo*) . . . . **12. G. coriacea** Pierre ex Dubard

b. Tertiary nerves inconspicuous, not parallel to secondary ones; secondary nerves 8—10; leaves more or less limited to upper parts of branchlets but not crowded, more or less reddish when dry; petioles 1.0—1.5 cm long; pedicels 1.0—1.8 cm long; calyx globular, more or less acute (*Luzon*).
13. G. obovatifolia (Merrill) Van den Assem

14a. Tertiary nerves hardly or only little discernible; secondary nerves not joined, tangential to leaf margins, at least at base; leaves relatively large and broad (*New Guinea*) . . . . **14. G. pachyphylla** (Krause) H. J. Lam

b. Tertiary nerves faint but conspicuous, at least underneath; secondary nerves mostly archingly joined but not always by a more or less straight intramarginal nerve 15

15a. Petioles more or less broadly and shallowly canaliculate above at apex; midrib far more prominent below than above; leaves more or less restricted to apical region of branchlets (*Borneo*) . . . . . . **15. G. pierrei** Van den Assem

b. Petioles flat or convex above at apex; no considerable difference in prominency of midrib above and below; leaves either more or less restricted to apical region of branchlets or scattered 16

16a. Tertiary nerves distinctly parallel to secondary ones, reticulate near margin only; secondary nerves archingly joined by a continuous intramarginal nerve; leaves more or less coriaceous 17

b. Tertiary nerves not distinctly parallel, mostly starting at greater angles from midrib than secondary ones, reticulation extant even near midrib; secondary nerves mostly not archingly joined, leaves more or less membranous . . . 19

17a. Leaves conspicuously long acuminate, midrib moderately prominent and convex below; pedicels 0.6—0.9 cm (*Borneo*) . . . **16. G. daemonica** Van den Assem

b. Leaves more or less acuminate; midrib little or not prominent above or, if prominent, not convex; pedicels 0.9 cm or longer 18

18a. Midrib above with median edge, at least at base; pedicels glabrous; pericarp glabrous (*Sumatra, Malay Pen., Riau, Banka, Belitong, Borneo*).
8. G. motleyana (de Vriese) Pierre ex Dubard

b. Midrib flat or hardly prominent above, never with median edge; pedicels more or less pubescent; pericarp with a golden appressed indumentum (*Malay Pen., Borneo*) . . . . **11. G. curtisii** (K. & G.) H. J. Lam

19a. Leaves rather long acuminate; midrib reddish below when dry; secondary nerves flat or slightly impressed above; pedicels 0.5—0.8 cm; corolla lobes acute at apex (*New Guinea*) . . . . **17. G. orientalis** Van den Assem

b. Leaves acuminate, mostly dark when dry; midrib dark and little prominent on either side; secondary nerves flat or prominulous above; pedicels 1.5—2.5 cm long; corolla lobes more or less rounded at apex (*Moluccas, New Guinea*).
9. G. boerlageana (Burck) Pierre ex Dubard
18. Ganua spec., cf. p. 399

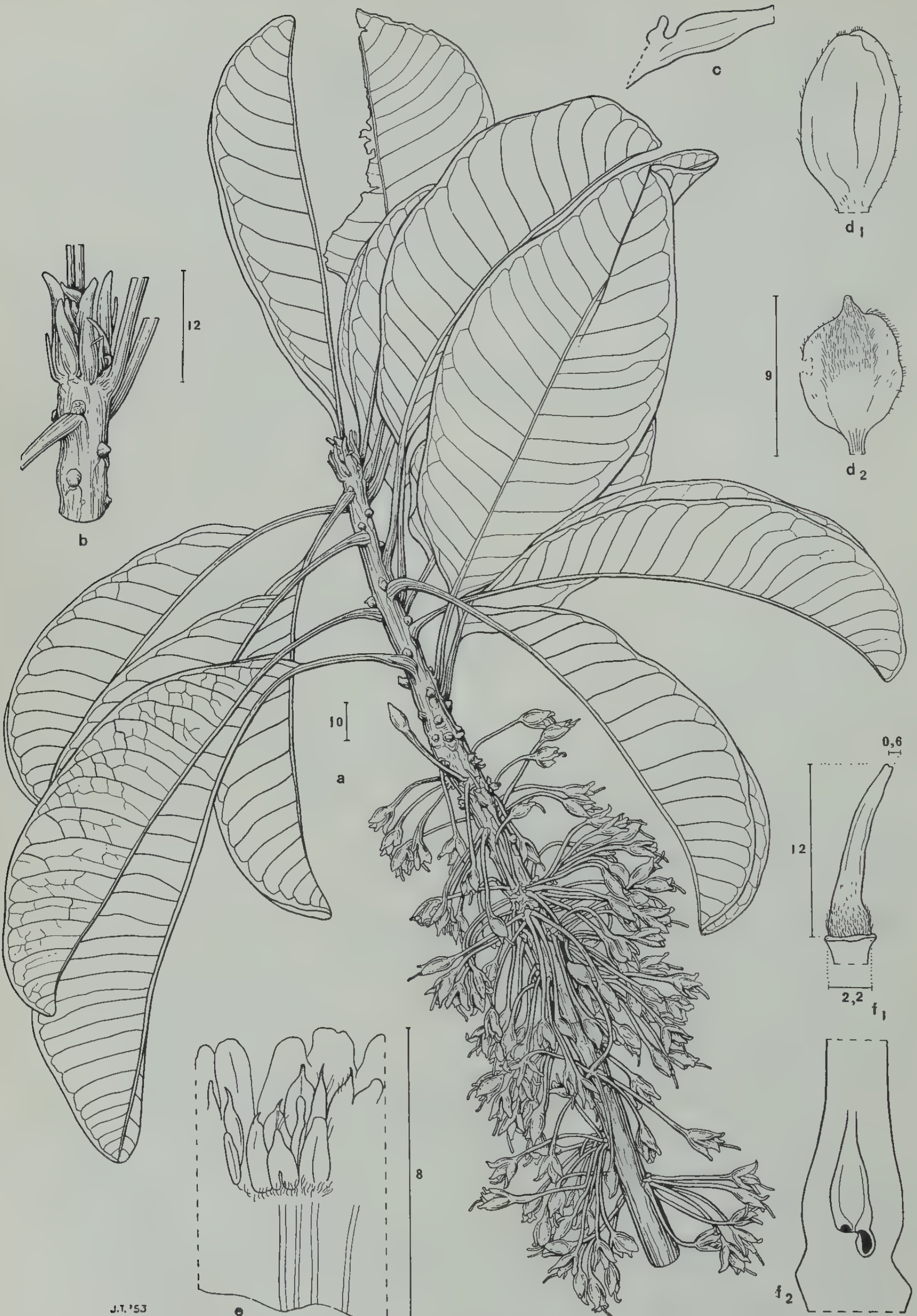


Fig. 2. *G. fusca* — a. branchlet with leaves and flowers; b. terminal bud; c. base of petiole with stipular organ; d. 1. outer sepal outside; d. 2. inner sepal outside; e. part of corolla inside; f. 1. ovary and style; f. 2. longitudinal section of ovary. From *type specimen*. Dimensions in mm.

1. **Ganua fusca** (Engler) Merrill, Enum. Born. Pl., Journ. As. Soc. Straits, Spec. Nr. Sept. 1921, 478; Lam 1925, 120; Lam 1927, 424.

Type specimen and basonym: *Beccari 3503,* type of *Illipe fusca* Engler — *Fig. 2.*

Distribution: W. Borneo.

Tree?; *terminal buds* conspicuous, scales about 1.4 cm long, swollen at base and there 0.5 cm wide, slightly tomentose, sometimes glabrescent, their stipules 0.5—0.7 cm long, about 0.1 cm wide at base, resembling those on petioles of the uppermost leaves; *leaves* conferted towards tips of branchlets but not crowded, elliptic to ovate; apex slightly acuminate, base broadly cuneate, not decurrent; petioles 2.6—3.4 cm long, apex narrowly canaliculate above, downwards slightly flattened, convex below, base swollen and ferruginously tomentose; blade 11—15 by 4.8—5.8 cm, glabrous above, densely ferruginously tomentose below, coriaceous; midrib impressed above, very prominent below; secondary nerves 12—16, prominulous above, prominent below, more or less curved towards apex, starting from midrib at angles of 70°—80°, in general in middle part of leaf archingly joined near margin; tertiary nerves on both sides not very conspicuous, starting from midrib almost parallel to secondary ones, reticulate and more or less transversal near margin; *inflorescences* rather close together below leaf region, 5—11-florous; pedicels 2.2—2.7 cm long, about 0.1 cm in diam., densely ferruginously tomentose; *sepals* ovate, about 0.8 by 0.5 cm, apex acute to distinctly broadly acuminate, outer sepals densely ferruginously tomentose outside, glabrous inside except for some hairs at base, inner ones with long appressed ferruginously coloured hairs, glabrous inside, fringed margins glabrous and thin; *corolla* tube funnel-shaped, glabrous, villous at throat, lobes oblong, as long as or longer than tube, apex more or less rounded, glabrous except for some hairs at tips; *stamens* 16, filaments villous, anthers pilose, connective sharply mucronate; *pistillum* 1.2 cm long, ovary densely ferruginously pubescent at base with 8 imperfectly closed cells, style glabrous and rather blunt; *fruit* not seen..

BORNEO. Sarawak, Kuching: *Beccari 3503* (*type spec.*) (FI, S), fl. II.

2. **Ganua kingiana** (Brace) Van den Assem, comb. nov. — *Bassia kingiana* Brace, in King & Gamble, Journ. As. Soc. Beng. LXXIV, 2, Extra nr. 17, 1905, 179 (contin. 388); Ridley, Fl. Mal. Pen., II, 1923, 267 — *Madhuca kingiana* (Brace) H. J. Lam, 1925, 159 — *Madhuca glaberrima* H. J. Lam 1925, 263 — *Ganua glaberrima* (H. J. Lam) H. J. Lam 1927, 428, fig. 11; Merrill, Univ. Calif. Publ. Bot. 15, 1929, 239 — *Ganua euphlebia* Merrill, MS.

Type specimen and basonym: *King's coll. 3314,* type of *Bassia kingiana* Brace.

Distribution: E. Sumatra, Malay Peninsula, N. Borneo.

Var. **kingiana** — Synonymy as in species, except for *G. euphlebia* Merrill MS.

Distribution: E. Sumatra, Malay Peninsula. — *Fig. 3.*

Terminal bud conspicuous, scales 0.5—1.0 cm long and 0.4—0.8 cm wide, triangular to lanceolate, stipular organs none; *leaves* crowded at apex, oblong to obovate, shortly acuminate at apex, base not decurrent;

petioles rough at base, narrowly canaliculate at apex above; midrib impressed above, very prominent below; secondary nerves 18—24, only prominent below, conspicuously archingly joined near margin; tertiary nerves starting from midrib almost parallel to secondary ones, near margin transversal; for *inflorescences* etc. see Remarks.

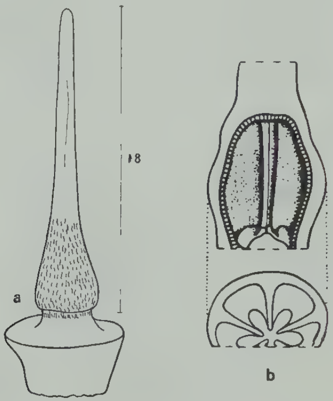


Fig. 3. *G. kingiana* var. *kingiana* — a. ovary and style; b. longitudinal section of ovary. From *Ridley 6238*. Dimensions in mm.

SUMATRA. East Coast, Asahan, Masihi: *NIFS bb 6341* (L).

MALAY PENINSULA. Perak, Larut: *King's coll. 3414* (*type spec.*) (KEP), fl. IX; ibidem: *King's coll. 3678* (KEP), fr. XII; Johore, Bukit Tinjau Laut.: *Corner s.n.* (SING); Singapore, Bukit Timah for.: *Corner s.n.* (SING); ibidem: *Ridley s.n.* (SING), young fr.; ibidem: *Ridley 6238* (BM), young fr.

Remarks: As Lam (1927) already pointed out this species does not quite fit in either *Ganua* or *Madhuca*. I decided to insert it into the former genus for reasons of nervation and flower characteristics, above all, however, because the cells of the ovary are found to be not quite closed. Since Lam stated that they are, it must be assumed that, like in *Ganua curtisii*, this character is a variable one here. The conoidal and pubescent ovary, which is gradually contracted into the glabrous style, the basally inserted ovules as well as the type of pubescence of the calyx lobes are also in favour of *Ganua*. The same may be said of the fruit, a rather thin walled, globose berry, however with many cells (up to 12), which are not perfectly closed. I did not see any seed.

The nervation is *Ganua*-like in so far as the tertiary nerves, starting more or less parallel to the secondary ones, are concerned. Towards the margins, however, they are generally transversal.

A large tree, up to 20 m high, with spreading branches, leaves rough in feeling, dark green, flowers pale with white, scented (King's coll.), fruit deep brown.

Vernac. name: putatat putatat (Sumatra). *Habitat*: open jungle, generally on low hills, in alt. up to 150 m.

Var. **euphlebia**, var. nov. — *G. euphlebia* Merrill, MS.

Type specimen: *Elmer 21571* (L).
Distribution: N. Borneo.

Nervi secundarii 26—34; *nervi tertiarii* distinctius transversi, unus medianus tantum prope costam secundariis parallelus; *inflorescentiae* pauciflorae.

Differs from the type variety by the following details: *secondary nerves* 26—34; *tertiary nerves* more distinctly transversal, only close to midrib being more or less parallel to secondary ones; *inflorescences* few-florous.

BORNEO. Elphinstone prov., Tawao: *Elmer 21571* (*type spec.* of var.) (L, S, SING), fr. X to III; Sandakan. Kabili for. res.: *Kadir A 609* (KEP, SING), fr. XI; ibidem: *Puasa FD 4840* (SING), fr. VI.

Remarks: Tree, up to 15 m high, fruit olive green.

Vernac. names: natu, nyatoh (Sandakan). *Habitat*: on hill top, up to 40 m alt.

3. **Ganua prolixa** Pierre ex Dubard, Bull. Mus. Hist. Nat. XIV, 1908, 409; Lam 1925, 130; Lam 1927, 427 — *Ganua elongata* Pierre in schedula in Herb. Beccari.

Type specimen: *Beccari 2446. — Fig. 4.*
Distribution: W. Borneo.

Scales of *terminal buds* conspicuous, about 1 cm long, a few mm wide at base, light-coloured, glabrous, without distinct stipules; *leaves* conferted at tips of branchlets, oblong, apex shortly acuminate, base cuneate, slightly decurrent; petioles 5—6.5 cm long, about 0.2 cm thick, base slightly swollen and rough, at upper side at apex flat with two faint grooves which fade out downwards, basal part cylindrical; blade 19.5—24 by 5.8—7.8 cm, entirely glabrous; midrib prominulous or flat above, very prominent below; secondary nerves 17—20, prominulous above, prominent below, starting from midrib at angles of about 80°, slightly curving to apex; tertiary nerves slightly prominulous above, most conspicuous below, starting from midrib almost parallel to secondary ones, more or less transversal near margin; *inflorescences* in axils of leaves at tips of branchlets, 5—7-florous; pedicels 1.3—1.8 cm long, about 0.15 cm thick, densely yellowish-grey tomentose; sepals oblong-ovate, apex acute or hardly acuminate, densely yellowish-grey tomentose outside, glabrous within, inner ones thinner; *corolla* and *stamens* unknown; *ovary* (and basal part of *style*) villous, 7—8-celled, cells imperfect.

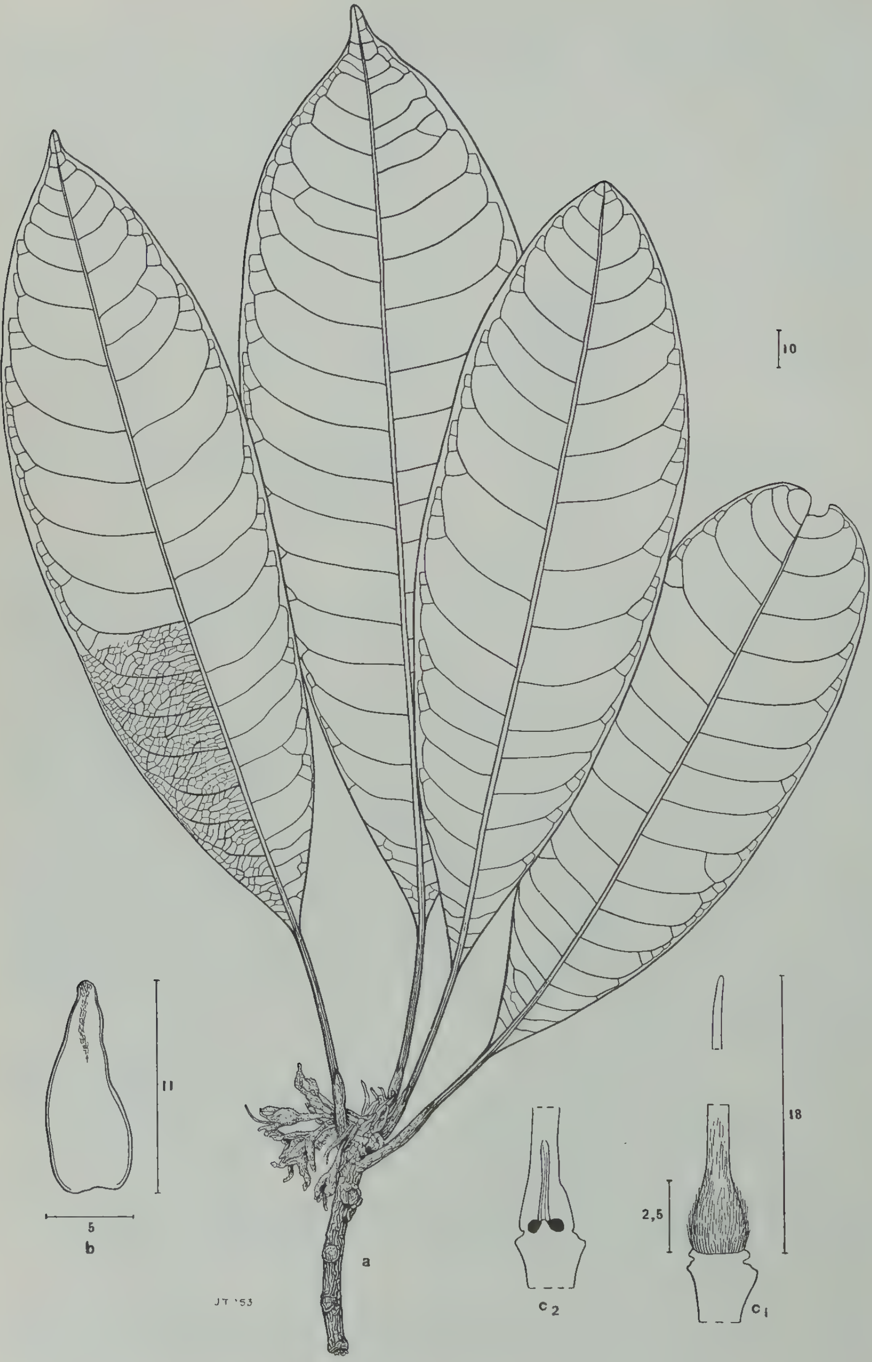
BORNEO. Sarawak, Kuching: *Beccari 2446* (*type spec.*) (FI), old fl. VIII.

Remarks: This species is the only one with inflorescences at the tips of the branchlets, a character also found in some *Payena*-species and particularly in the genus *Burckella*.

4. **Ganua sarawakensis** Pierre ex Dubard, Bull. Mus. Hist. Nat. XIV, 1908, 409; Lam 1925, 130; Lam 1927, 429 — *Ganua glabrescens* Pierre in schedula in Herb. Beccari — *Ganua attenuata* Griffioen & Lam, MS.

Type specimen: *Beccari 3105. — Fig. 5.*
Distribution: Borneo.

Tree; *terminal buds* with very conspicuous narrowly triangular scales, 1 cm long, about 0.3 cm wide at base, glabrous, their stipules smaller and


10
11
5
b
a
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c2
18
2,5
c1

narrower; *leaves* crowded at apex of branchlets, oblong to obovate, not or hardly acuminate, base decurrent; petioles short, 0.6—1.6 cm long, about 0.3 cm thick, swollen and rather rough at base, near apex broadly canaliculate above, glabrous; blade 12—25 by 3—6 cm, glabrous on both sides; midrib impressed or flat above, prominent below; secondary nerves 10—16, prominulous above, prominent below, starting from midrib at angles of 50°—70°, gradually curving towards the apex, no continuous intramarginal nerve joining secondary nerves; tertiary nerves slender, starting from midrib almost parallel to secondary ones, reticulate near margin; *inflorescences* close together, in axils of leaves and scars below leaf region, 5—10-florous; pedicels 1.5—3.5 cm long, glabrous; *sepals* ovate to elliptic, obtuse or slightly acuminate at apex, sparsely hairy, margins ciliate, darkly tufted at apex; *corolla* white, tube glabrous, except in throat, lobes 8, oblong, as long as tube, apex obtuse and sparsely pubescent; *stamens* 16, filaments 0.05—0.1 cm long, pubescent, anthers with some hairs, connective slightly protruding and mucronate; *pistillum* 1.2 cm, ovary (sparsely) villous, imperfect cells 7—8, leaving considerable internal space above placenta, style glabrous; *fruit* not seen.

BORNEO. Sarawak, Kuching: *Beccari 3105* (*type spec.*) (FI), fl. II; ibidem: *Haviland 2318* (BM, L), fl. I; S. & E. Borneo, Beru betumu Air: *De Zwaan* (*NIFS bb. 18999*) (L).

Remarks: A large tree up to 30 m high, corolla white. In the Beccari specimen the pedicels are shorter than in the Bartlett one, averaging 2—3.5 cm, the leaves being relatively broader. The identity of *NIFS bb. 18999* (sterile) is not beyond doubt but its nervation is quite identical with that of the type.

Vernac. name: putat gunung (S. & E. Borneo). *Habitat* in S. & E. Borneo: never inundated, sandy soil, steep country, common tree, scattered in primary forest, alt. 200 m.

Maybe some specimens of this species have been distributed under the name *G. attenuata* Griffioen & Lam, which is a *nomen nudum*.

5. **Ganua pallida** (Burck) H. J. Lam 1925, 127, fig. 36; Lam 1927, 427.

Type specimen and basonym: *Burck s.n. (H. L. B. 908. 225—6)*, Sumatra, Mt Singgalang, type of *Bassia pallida* Burck.

Distribution: Sumatra, Borneo (Sarawak, f. Lam 1927).

Terminal bud with distinct narrowly triangular scales, about 1 cm long and 0.3 cm wide, glabrous, their stipules half as long and 0.1—0.15 cm wide, the petioles of uppermost leaves sometimes provided with similar stipules; in fertile twigs *leaves* crowded at apex; *inflorescences* close together below leaf region.

SUMATRA. East Coast, Petani: *Van Romburgh 78* (L); ibidem, Bandar baru: *Lörzing 6823* (L, SING), fl. VII; West Coast, Mt Singgalang: *Burck s.n.* (*type spec.*) (L), fr. VIII.

Remarks: A tree of about 15 m high, leaves bright green, corolla

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Fig. 4. *G. prolixa* — a. branchlet with leaves and flowers; b. outer sepal outside; c. 1. ovary and style; c. 2. longitudinal section of ovary. From *type specimen*. Dimensions in mm.

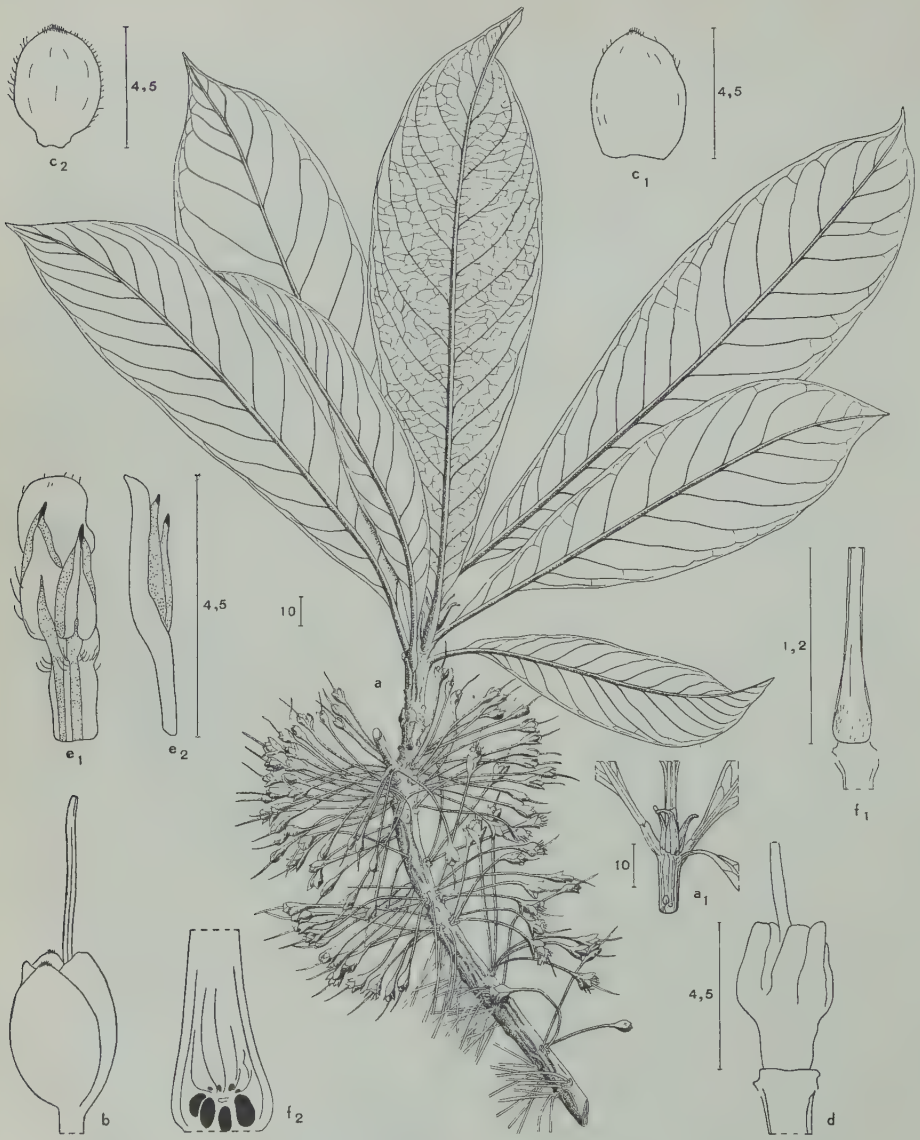


Fig. 5. *G. sarawakensis* — a. branchlet with leaves and flowers, a. 1. terminal bud; b. calyx; c. 1. outer sepal outside; c. 2. inner sepal outside; d. corolla outside; e. part of corolla and stamens inside; f. 1. ovary and style; f. 2. longitudinal section of ovary. a. from *Haviland 2318*, b.—f. from *type specimen*. Dimensions in mm.

bright yellow-green, tips of lobes whitish, flowers fragrant, latex white, young leaves chocolate-coloured.

Vernac. names: majang sudu or susudu (Batak), majang ketapang

(Mal.). *Habitat:* in forest, alt. 1200 m. The specimen from Borneo, quoted by Lam, was not examined and its whereabouts are unknown.

6. **Ganua monticola** (Merrill) H. J. Lam, comb. nov. — *Bassia monticola* Merrill, Phil. Journ. Sci. Bot. X, 1915, 56 — *Madhuca monticola* (Merrill) Merrill, Enum. Phil. Flow. Pl. III, 3, 1923, 277; Lam 1925, 180; as a synonym of *Ganua boerlageana* (Burck) Pierre ex Dubard in Lam 1927, 427. — *Fig. 6.*

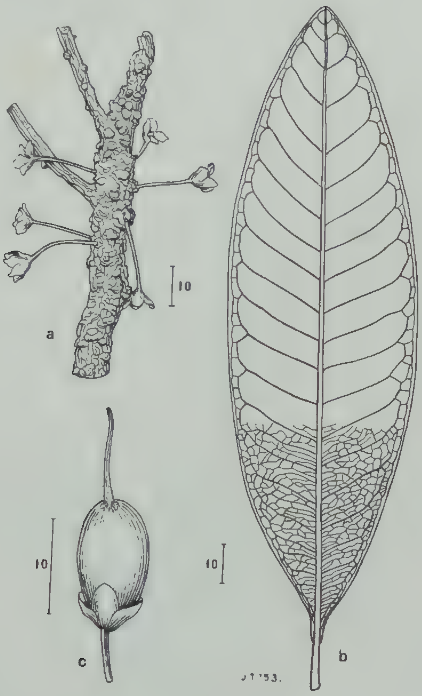


Fig. 6. *G. monticola* — a. branchlet with fruiting calyces; b. leaf and nervation; c. fruit. From *Merrill 9622.* Dimensions in mm.

Type specimen and basonym: *Merrill 9622,* type of *Bassia monticola* Merrill.

Distribution: Palawan, Sibuyan? (f. Merrill), Borneo? (cf. Note).

Scales of *terminal bud* about 0.7 cm long, about 2 mm broad at base, slightly pubescent at margins; uppermost leaves sometimes with small stipular organs, 0.2 cm long; *leaves* crowded at tips of branchlets, oblong to oblong-lanceolate; petioles 1.0—1.6 cm long, cylindrical, somewhat swollen at base; blade 8.8—15.5 by 2.7—5 cm, apex obtuse, base cuneate; midrib prominulous above, prominent below; secondary nerves 13—18, slender, prominulous on both sides; *pedicels* 1.2—2.2 cm long, glabrous, densely furfuraceously pubescent at base; young *fruits* ovoid to oblong-ovoid (f. Merrill 1915).

PALAWAN. Silanga: *Merrill 9622* (*type spec.*) (BM, L, NSW), fr. V.

Note. Of some specimens from British North Borneo (*Apostal 22, Wood 1261, 1889*) and from Sarawak (*Garaman 2311, 2789*), annotations by Lam were found in the Rijksherbarium. Unfortunately, however, the specimens themselves could not be traced anymore, which is the more regrettable since they would mean new localities. Merrill mentions the species also from Sibuyan but we are not sure that the specimens concerned (*For. Bur. 22498, 27903*) belong to *G. boerlageana* or to *G. monticola*. They could not be traced either.

7. **Ganua beccarii** Pierre ex Dubard, Bull. Mus. Hist. Nat. XIV, 1908, 408; Lam 1925, 130; Lam 1927, 429.

Type specimen: *Beccari 2241*. — *Fig. 7.*

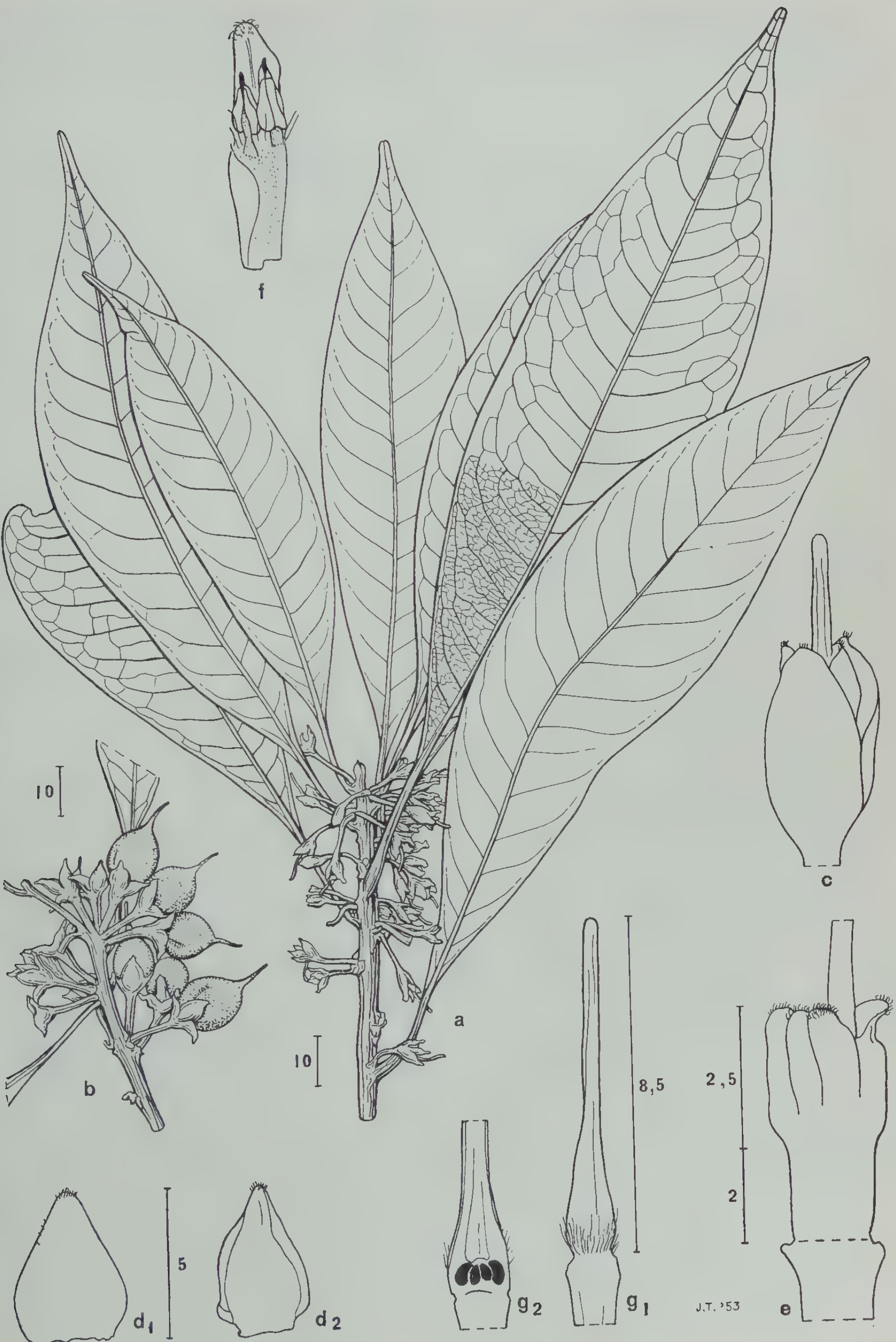
Distribution: W. Borneo.

Terminal bud with small, narrowly triangular ferruginously tomentose scales, without stipular organs; *leaves* scattered along branchlets, elliptic to oblong, apex rather long acuminate, base cuneate, decurrent; petioles 2.0—2.8 cm long, flattened at apex above, somewhat swollen and rough at base, from base to halfway up ferruginously tomentose, glabrescent; blade 11.2—17 by 3—4.6 cm, entirely glabrous on both sides, rather thin; secondary nerves 13—16, rather slender, little prominent above, prominent below, starting from midrib at angles of 60°—70°, more or less straight, curving towards apex near margin, no continuous intramarginal nerve; tertiary nerves faint, conspicuous and prominulous on both sides, near midrib some minor nerves starting almost parallel to secondary ones, tertiary nervation densely reticulate all over leaf; *inflorescences* scattered along branchlets, in axils of leaves or their scars, 5—8-florous; pedicels 0.6—1.0 cm long, densely ferruginously tomentose; *sepals* ovate, about 0.5 cm long, densely ferruginously tomentose, glabrous within, except near margins, mostly darker at apex and there with a small tuft of dark hairs, margins ciliate near tip, inner sepals thinner; *corolla* tube about 0.3 cm long, pubescent at throat, glabrous within, lobes 8, more or less ribbon-shaped, about 0.28 cm long, villous at apex on both sides; *stamens* 16, filaments 0.1 cm long, relatively broad, pilose, anthers oblong, about 0.1 cm long; *pistillum* about 8.5 mm long, ovary ferruginously pubescent, cells 8, imperfect; pedicels of fruit thickened, about 1 cm long, 0.2 cm in diam., woody; *fruit* more or less globose, densely ferruginously tomentose, about 1.2 cm long, 0.7 cm in diam., cells imperfect, 1- or 2-seeded.

BORNEO. Sarawak, Kuching: *Beccari 2241* (*type spec.*) (FI), fl. VII; ibidem: *Beccari 2958* (FI), fr. XII.

Remarks: Mainly on account of nervation a relation to *G. sessilis* and *G. boerlageana* may be supposed.

Fig. 7. *G. beccarii* — a. branchlet with leaves and flowers; b. branchlet with fruits; c. calyx; d. 1. outer sepal outside; d. 2. inner sepal outside; e. corolla outside; f. part of corolla and stamens inside; g. 1. ovary and style; g. 2. longitudinal section of ovary. a, c—g. from *type specimen*, b. from *Beccari 2958*. Dimensions in mm.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8. **Ganua motleyana** (de Vriese) Pierre ex Dubard, Rev. Gén. Bot. XX, 1908, 202 (err. *mottleyana*); Lam 1925, 122; Lam 1927, 424 — *Ganua scortechinii* (K. & G.) H. J. L., 1925, 126; Lam 1927, 427. — *Fig. 8.*

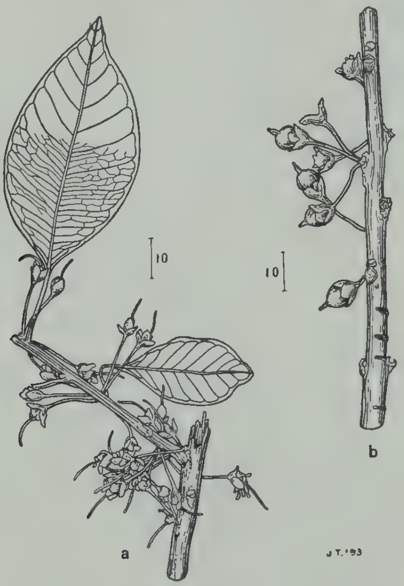

Fig. 8. *G. motleyana* var. *motleyana* — a. branchlet with inflorescences; b. ditto with young fruits. From *type specimen.* Dimensions in mm.

Type specimen and basonym: *Motley 857*, type of *Isonandra motleyana* de Vriese.

Distribution: Sumatra (cf p. 366), Malay Peninsula, Riau, Belitong, Borneo.

General remarks: *Ganua motleyana* is a rather common and variable species. Thanks to rather abundant material of this species, especially from the Bogor, Kepong, Leyden and Singapore herbaria, it was possible to get a survey of this species. Since all characters Lam used when distinguishing three varieties (*latifolia, rubro-pedicellata* and *glabrescens*) and a new species (*G. scortechinii*) appear to be largely overlapping, there is no reason to maintain this subdivision, the more so as the varieties mentioned are not geographically correlated. An exception must be made for *G. scortechinii*, whose combination of big flowers, relatively short and stout pedicels, relatively broad leaves and short petioles, together with the fact that a continuous intramarginal nerve is often wanting, justifies a subdivision into two varieties (cf. King & Gamble 1905), though the specific rank could, in our opinion, not be maintained.

Var. **motleyana** — Synonymy as in species, except for *Ganua scortechinii* H. J. L.; distribution as species.

Terminal buds rather inconspicuous and small, stipular organs not found; *leaves* more or less scattered along branchlets, ovate to obovate to oblong-obovate, distinctly to hardly acuminate at apex, base broadly to acutely cuneate, more or less decurrent; petioles 1.3—4 cm long, more or less cylindrical, entirely dark or only so at base, never distinctly rough there; blade 5—20 (f. Lam up to 25) by 2.5—8 cm; midrib little prominent on either side, above, particularly in the basal part, almost always with a more or less distinct median edge; secondary nerves 13—23, slender but conspicuous, prominulous on both sides, more or less straight, continuously archingly joined near margin; tertiary nerves conspicuous below, at least one tertiary nerve distinctly parallel between two secondary ones, reticulate near margins; *inflorescences* in axils of leaves or their scars, 3—15-florous; pedicels 1—2.3 cm, glabrous; *sepals* 0.3—0.4 cm long, more or less bluntly acuminate and with a tuft of dark hairs at apex, inner ones practically always appressed sericeously pubescent except near fringed margins; *corolla* tube and lobes in open flower varying as to dimensions, tube glabrous, throat slightly, never densely pubescent, lobes 8—10, at apex broader than at base; *stamens* 16—22; *ovary* glabrous, cells 6—8, septa imperfect, hardly discernible to distinct, rarely perfect; pericarp glabrous; leaves of seedlings lanceolate.

SUMATRA. Atjeh and Dep., Tiamang, Tengulun: *NIFS bb. 12210**; East Coast, Benkalis, Ulu S. Lakar: *NIFS bb. 12842* (L), fr. X; ibidem, Mendol Isl.: *NIFS bb. 13795* (L), young fr. IX; ibidem, Selatpandjang, Tandjungsemak: *NIFS bb. 25559* (L), fr. and galls XI; ibidem: *NIFS bb. 12478**; ibidem: *NIFS bb. 13834**; Selapung: *NIFS bb. 12924**; ibidem: *NIFS bb. 12928**; Djambi, Simpang: *NIFS bb. 13136**; Tebingtinggi: *NIFS bb. 13649**; West Coast, Lubuk ganggo: *NIFS bb. 5474* (L); Riau, Indragiri, P. Gelang: *NIFS bb. 29094* (L); Kariman, P. Kundur Si-untung: *NIFS bb. 10661**; Palembang, Banjuasin and Kubu countries, Semuntul: *NIFS bb. 15487* (L); ibidem: *Endert 356* (L), fl.; ibidem: *Grashoff 765* (L), fl.; ibidem: *De Vriese 3748* (L); Lampongs, Tulangbawang, Menggala: *NIFS bb. 15460* (L), fr. III; Coll. Plant. Expos. *Paris 1878* verisimiliter sumatranum 20 (L), fr.; without further indication of locality: *Teysmann 3748* (= ? *De Vriese 3748*).

MALAY PENINSULA. Kedah, Yan Kechil, *Salih FD 8974* (KEP); Perak. Kuala kangsari: *FD 41572* (KEP), fr.; Kelantan, Marang Trengganu: *Arnot FD 44785* (KEP); Selangor, Klang, Telok for. res.: *Yeob FD 3265* (KEP); ibidem: *Walton FD 27071* (SING); ibidem, S. Tinggi, Tanjong karang: *Md Nur FD 34107* (L, SING), fl. X; ibidem, Carey Isl., K. Langat: *Symington FD 43301* (SING), fr. I; ibidem, Klang, Olar Limpit: *Symington FD 43689* (KEP); ibidem, S. Pelek: *Denny s.n.* (SING), fl. IX; ibidem, Sepang: *Denny s.n.* (KEP); Pahang, Tanjong Api, Kuantan: *Yeob FD 3605* (KEP, SING), fr. XII; ibidem, Ktan St. Land, Tanahpamah: *Awang FD 17225* (KEP), fl. IX; ibidem, Bukit Goh for. res.: *Ismail FD 9626* (SING), seedlings VII; ibidem, Kemansut res.: *Ahmat FD 29960* (KEP); ibidem, Temerloh: *FD 29958* (KEP), seedlings; ibidem, Kemansut res.: *Browne FD 40685* (KEP); ibidem: *FD 40713* (KEP); ibidem, Kuantan, Pekan road: *Jaamat FD 43195* (SING), young fr. I; ibidem, Kuantan: *Yeob s.n.* (KEP); ibidem, Kuala Jasek: *coll?* (KEP); ibidem, Ulu S. Belat State Land: *FD 65673* (KEP), young fr. X; ibidem: *FD 65692* (KEP), young fr. II; N. Sembilan, Pasoh for. res.: *Kinsey FD 1918* (KEP, SING), fl. VI; Malacca: *Griffith s.n.* (BM), fl.; Johore, S. L. Kirih Mudah, Ulu Sg Benut; *Zakaria-b-Sulong FD 72904* (KEP); ibidem, S. Ban: *FD 6496* (SING), fl.; ibidem, S. Pendas: *Comer FD 32253* (SING), young fr. II; ibidem, Jenan riv.: *Ridley FD 13489* (BM), fl. VIII; ibidem, Merleman, *Terry FD 1026* (SING), fl. galls; Singapore, Changi: *Ridley FD 5645* (SING), old fl.; S. Jurong: *Ridley s.n.* (SING), fr.; state unknown, Bukit Mandai: *Bayliss FD 5896* (SING), fr. I; S. Kaya: *Kiah FD 32154* (SING), fl. X.

RIAU. Karimon, S. Guntung: *NIFS bb. 4939* (L), fl.; ibidem, Taga radja: *NIFS bb. 5382* (L); ibidem, S. Simpang Kanan: *NIFS bb. 9968* (L).

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* Not seen by me personally but based upon annotations by Lam.

BANKA. Lobok besar: *Anta 146* (BO, L), fr. VIII; ibidem: *Anta 157* (BO, L), fr. VIII; ibidem: *Anta 319* (BO, L, SING), fl. IX; ibidem: *Kostermans 18* (BO, L); ibidem: *Kostermans 21* (*NIFS bb. 33959*) (BO,L), fl. VIII; ibidem: *De Vriese s.n.* (BO, L); Blinju: *Grashoff s.n.* (L).

BELITONG. *W. A. Riedel s.n.* (FI), fl. buds X; ibidem: *Teysmann 11099* (L); ibidem: *Teysmann s.n.* (L, SING), fl. fr.

BORNEO. West Borneo, Pontianak, Kubupari: *NIFS bb. 6359* (L); ibidem: *NIFS bb. 2022* (L); ibidem: *Akbor 2340* (L), galls; ibidem: *Akbar bin Adan 2022* (L), buds VIII; Lower Matan, S. Kendawangan: *NIFS bb. 14412**; Pemankat, Paloh: *NIFS bb. 11337**; Sarawak: *Baring Gould S 22* (SING), old fl.; British North Borneo, Jesselton: *coll.?* (SING), fr. III; Kg Hindian, Maraba: *Melegrito FD 2308* (BO), fl. VII; Sandakan, Kimanis for. res.: *Kwan Ting A 354* (L, SING), buds V; South and East Borneo, Tidung countries, Supil: *NIFS bb. 17773* (L); ibidem, Seputuk: *NIFS bb. 17829* (L); ibidem, Malinau: *NIFS bb. 17861* (L); ibidem, Pembiliangan: *NIFS bb. 18139* (L); ibidem: *NIFS bb. 18263**; Kutai, Kembang Djanggul: *NIFS bb. 15689* (L); ibidem, Longbleh: *NIFS bb. 16042* (L); ibidem, Mujup: *NIFS bb. 16757* (L); ibidem: *NIFS bb. 16821* (L); ibidem: Kelumpang: *NIFS bb. 16997* (L); ibidem, S. Gong Djohoa, Longbleh: *NIFS bb. 24020* (L, SING); ibidem: *NIFS bb. 24021* (L, SING); ibidem, Kg Djanggung: *NIFS bb. 24662* (L, SING); ibidem, Rapahnasah: *NIFS bb. 24664* (L, SING); ibidem: *NIFS bb. 24665* (L); ibidem: *NIFS bb. 17861*; Djeniau: *Endert 5087* (L), old fl. XI; Buntok, Madarabaru: *NIFS bb. 21264* (L); Muarateweh: *NIFS bb. 28082* (L); ibidem: *NIFS bb. 28083* (L, SING), fr. V; Lower Dajak, S. Mentan: *NIFS bb. 27757* (L, SING); ibidem, Danau ranah: *NIFS bb. 13482**; Amuntai: *NIFS bb. 7797* (L), old fl. XII; ibidem: *NIFS bb. 7797* (L); Banjermasin: *Korthals s.n.* (L), fl. fr. VIII; Martapura: *Korthals s.n.* (L), fr. VIII; Berau, Telukdaun, S. Kasei: *NIFS bb. 12206**; Banjermasin: *Motley 857 (type spec.)* (L, P), fl. fr.; Sampit: *Buwalda 29 (NIFS bb. 32406)* (BO, L), fl. IX; ibidem: *Buwalda 7840* (BO, L), old fl. IX; ibidem: *Buwalda 7850* (BO, L), fl. IX; ibidem, Dukusati, Saranau: *NIFS bb. 12470**, young fr.; ibidem, Sungeidalung: *NIFS bb. 14579**, fr.; L. Dayak, Danau Ranah: *NIFS bb. 13482**; ibidem: *Versteegh s.n. (NIFS bb. 33064)* (L, SING), old fl. IX; Kuala Kapuas Sungeimasulan: *NIFS bb. 15076* (L), fl. XI; no loc.: *NIFS bb. 2364* (L).

Remarks: A large tree, up to 30 m high. Buds yellow-green to reddish-yellow, flowers yellow or green, fruits yellow-green, green, or reddish, latex white. Bark brown inside, grey outside, sapwood pale, wood yellowish. Buttresses are reported (*NIFS bb. 33959*) as well as knee roots, sometimes swollen into knobs (*FD 43301*).

Vernac. names: djulutu (Sumatra), basong (Malay Pen.), benku (Sumatra, Malay Pen.), katiau or ketiau (Sumatra, Riau, Banka, Borneo), kahan, nyatoh, gedis, satan, babi, luba (Borneo), nyatoh tanjong (Malay Pen.). *Habitat:* Fairly common in lower areas up to 50 m alt. Scattered or few specimens together in primary forest, localities frequently inundated in the wet season, soil peaty or sandy, flat country, swampy; on borderline of *Agathis* forest and peat forest (Banka). Only one specimen (*Anta 319,* Lubuk ganggo) reported from 600 m alt.

Var. **scortechinii** King & Gamble, Journ. As. Soc. Beng. LXXIV, 2 Extra nr. 17, 1905, 178 — *Ganua scortechinii* (K. & G.) H. J. L. 1925, 126; Lam 1927, 427.

Type specimen: *King's coll. 5454.*

Distribution: Malay Peninsula.

Differs from the type in the following characters: *leaves* larger and broader, 13—17 by 5.5—8.5 cm; petioles shorter (1.6—2.2 cm); secondary nerves 14—16, less slender and near margin often joined in a more complex way; *flowers* larger; sepals 0.5—0.6 cm long, triangular and relatively narrow (f. Lam 1925).

MALAY PENINSULA. Perak: *King's coll. 5454* (*type spec.* of var.) (SING), fl. I.

Remarks: Large tree, 20—25 m high, leaves glossy deep green, flowers white, fruit dark green, 1.3 cm in diam..

Habitat: dense jungle, low wet grounds below 30 m alt.

9. **Ganua boerlageana** (Burck) Pierre ex Dubard, Rev. Gén. Bot. XX, 1908, 201; Lam 1925, 129; Lam 1927, 427.

Type specimen and basonym: *Burck s.n.* in Hort. Bog. cult., type of *Payena boerlageana* Burck — *Fig. 9a.*

Distribution: Moluccas, New Guinea.

Var. **boerlageana** — Synonymy as in species; distribution ditto, except New Guinea.

Terminal bud rather conspicuous, scales narrowly triangular, glabrous, without stipular organs; *leaves* dispersed along branchlets, oblong-obovate to elliptic, base cuneate up to 30°; blade 14—24 by 4—7 cm, more than 3 times longer than wide; midrib little prominent on either side; secondary nerves prominulous on either side, starting from midrib at angles of 70°—80°, straight, curving towards apex near margin, 7th and 8th secondary nerve 0.7—1.5 cm apart; generally one tertiary nerve in its basal part more or less parallel to the two adjoining secondary nerves, additional tertiary nerves starting at greater angles from midrib, loose reticulation all over the leaf, densiest near margin; *inflorescences* scattered along branchlets; pedicels 1.5—2.5 cm long, glabrous; flowers relatively slender; *sepals* ovate, apex acute, ciliate, glabrous within, inner sepals thinner, especially near margin, fringed; *corolla* lobes more or less rounded at apex, appressedly pubescent on either side, margins fringed; ovary 6-celled (type specimen), cells imperfect; no *fruits* seen.

MOLUCCAS. Sula Isl., Mangoli, Lampau: *NIFS bb. 29906* (L, SING); Morotai, W. slope of G. Sabatai: *Lam 3541* (L); Halmaheira: *Teysmann 5652* (L); Gebeh: *Teysmann 7818* (L); Amboina, Waai: *NIFS bb. 25976* (L, SING); ibidem: *NIFS bb. 10100* (BO, L); ibidem: *NIFS bb. 10105* (L); ibidem: *coll.?* (L); ibidem, Salahutu: *Eyma 3050* (BO); Cult. in Hort. Bot. Bog.: *Burck s.n.* (*type spec.*) (BO, L, NY, SING), fl.

Remarks: The annotation on the type specimen "Java" is most probably erroneous. Flowers greenish white.

Vernac. names: arupah merah (Amboina), arupa putih (ibidem), raka (Morotai). *Habitat:* reported from localities below 125 m.

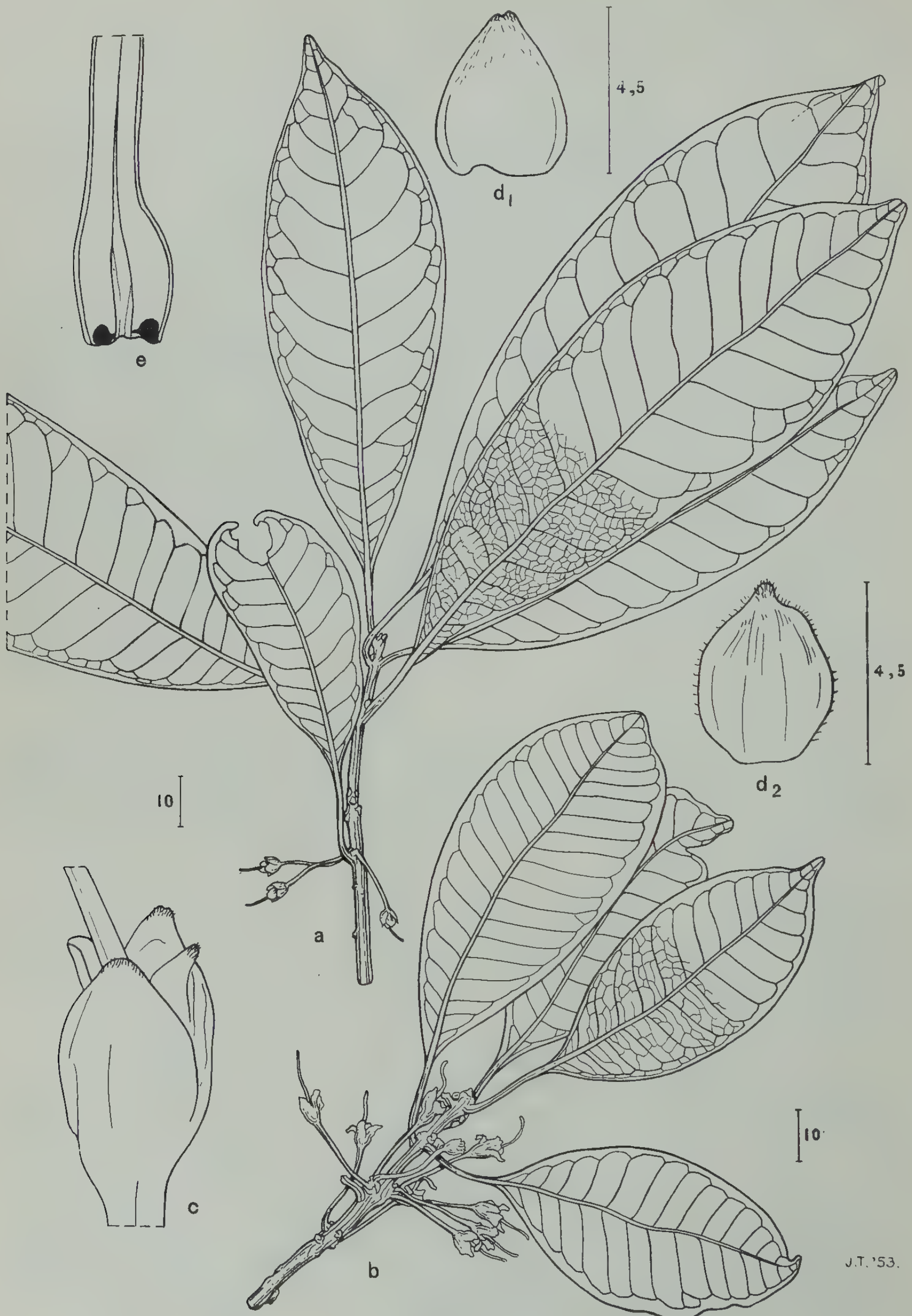
Var. **latifolia,** var. nov..

Type specimen: *Aet & Idjan 871* (L) — *Fig. 9b—e.*

Distribution: W. New Guinea.

Gemma terminalis ea var. typicae similis; *folia* elliptica vel ovata, apice distincte late acuminata, basi cuneata; lamina 7—12.5 (—16.5) × 2.8—5.2 cm, plerumque 3 × latitudine brevior, in siccitate plerumque supra fusca; nervi secundarii subtus tantum prominentes, angulo usque ad 90° de costa adscendentes, nervi secundarii 7mi et 8vi 0.3—0.7 inter se distantes, angulo quam in var. typica maiore; *inflorescentiae* in ramulis dispersae; *sepala* ovata, 0.4—0.5 cm longa, quam in var. typica angustiora, apice late acuminata, interiora sericeo-pubescentia, apice cirrosa; *ovarium* 6—7-loculatum, loculis imperfectis; *fructus* ignoti.

Terminal bud as in var. *boerlageana*; *leaves* elliptic to ovate, apex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more or less distinctly broadly acuminate, base cuneate (angle 40° or more); blade 7—12.5 (—16.5) by 2.8—5.2 cm, majority of leaves shorter than 3 times their width, in a dry state mostly with a characteristic brown colour above; secondary nerves prominent only below, flat or slightly impressed above, starting at angles up to 90° from midrib, 7th and 8th secondary nerves 0.3—0.7 cm apart; most tertiary nerves, if conspicuous at all, starting at greater angles from midrib than secondary ones; *inflorescences* scattered along branchlets; *sepals* ovate, 0.4—0.5 cm long, relatively narrower than in type variety, apex broadly acuminate, inner ones sericeously pubescent, apex tufted; *ovary* 6—7-celled, cells imperfect; no ripe *fruit* seen.

NEW GUINEA. Babo: *NIFS bb. 21821* (L); Meosnoem: *NIFS bb. 30957* (A, L), old fl. X; ibidem: *NIFS bb. 30936* (L, SING); ibidem: *NIFS bb. 30958* (KEP, L, SING); ibidem: *NIFS bb. 30972* (L, SING), old fl. X; Biak Isl.: *NIFS bb. 30860* (L, SING); ibidem: *NIFS bb. 30886* (L); ibidem: *NIFS bb. 30753* and *bb. 30892,* old flow. IX; Japen Isl., Seroei: *NIFS bb. 30340* (L); ibidem: *NIFS bb. 30739* (A, L, SING), old fl. IX; ibidem: *NIFS bb. 30893* (A, L, SING); ibidem: *NIFS bb. 30263* (L, SING); ibidem, Dowai, Ansoes: *NIFS bb. 20060* (L); ibidem, Marialtoe: *NIFS bb. 30372* (L, SING); ibidem, Arijom, *Aet & Idjan* (*Exp. Van Dijk*) *911* (BO, L), old fl. IX; ibidem: *Aet & Idjan* (*Exp. Van Dijk*) (*type spec.* of var.) (BO, L), old fl. IX; Hollandia, Berap: *NIFS bb. 28904* (L).

Remarks: The main differences between the two varieties are found in leaf characteristics (dimensions, base, nervation, colour). The number of secondary nerves (11—20) and the terminal bud are identical. In var. *latifolia* the pedicels are much stouter than in var. *boerlageana.* It must be borne in mind that of var. *latifolia* only old flowers (no ripe fruits) are known, which implies the possibility of some influence of fruit formation on the stoutness of the pedicels.

The new localities include the first records of *Ganua boerlageana* from New Guinea.

Habitat: collected at alt. up to 800 m alt.

10. Ganua sessilis (K. & G.) H. J. Lam 1925, 120, fig. 34; Lam 1927, 424.

Type specimen and basonym: *Ridley 5076,* type of *Payena sessilis* K. & G.

Distribution: Malay Peninsula (Singapore), Belitong, Borneo (S. & E. Borneo).

Scales of *terminal bud* conspicuous, lanceolate to narrowly triangular, 0.4—0.5 cm long, a few mm wide at base; no stipular organs; *leaves* and *inflorescences* more or less scattered along branchlets.

MALAY PENINSULA. Singapore: *Ridley 5076* (*type spec.*) (SING), fr. III.
BORNEO. Lupok, Kuala Kapuas: *Delmaar 2329* (L), fr. IV.

Remarks: The Borneo specimen is identical with the type specimen. The Belitong specimen (Lam 1927, 424) could not be checked with the type. On account of nervation characters (reticulate tertiary nerves) a relation to *G. beccarii* is supposed.

Fig. 9. *G. boerlageana* var. *boerlageana* — a. branchlet with flowers —var. *latifolia* — b. branchlet with leaves and flowers; c. calyx; d. 1. outer sepal outside; d. 2. inner sepal outside; e. longitudinal section of ovary. From *type specimens.* Dimensions in mm.

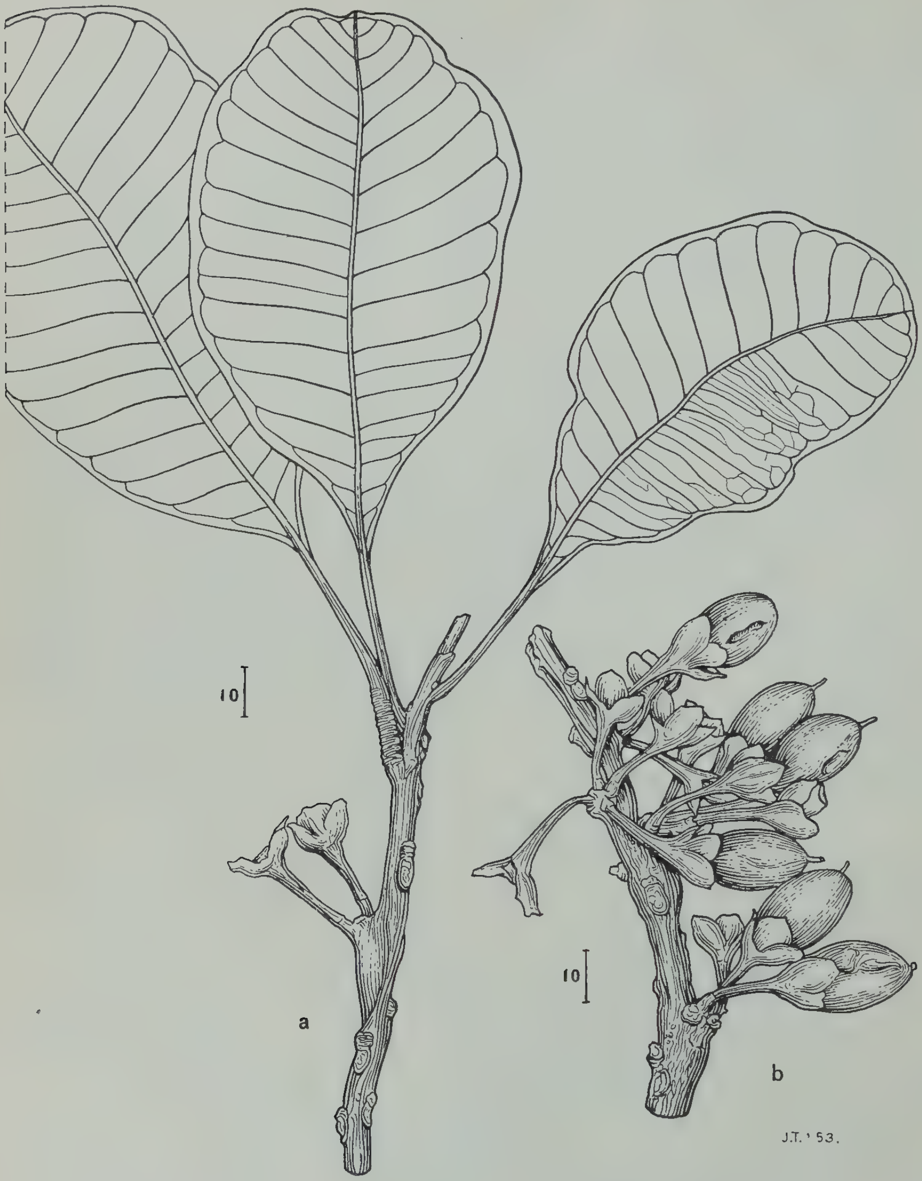


Fig. 10. *G. curtisii* — a. branchlet with fruiting calyces; b. ditto with fruits. From *NIFS bb. 11366.* Dimensions in mm.

11. Ganua curtisii (K. & G.) H. J. Lam 1925, 126; Lam 1927, 425 — *Ganua chrysocarpa* Pierre ex Dubard, Bull. Mus. Hist. Nat. XIV, 1908, 407; Lam 1927, 429. — *Fig. 10.*

Type specimen and basonym: *Curtis 1451*, type of *Bassia curtisii* K. & G. (the *lectotype* being *1451a*).

Distribution: Malay Peninsula, Borneo.

Terminal bud small, without distinct stipular organs; *leaves* scattered along branchlets; petioles 1.5—2.6 cm long, not or hardly swollen at base, glabrous, apex more or less rounded; blade 9—15 by 3.6—6.9 cm, relatively broad, coriaceous; midrib above flat or hardly prominent, always lacking the sharp median edge of *G. motleyana*; secondary nerves 11—18; tertiary nerves parallel to secondary ones, reticulate in marginal region; *inflorescences* in axils of leaves or their scars, 3—12-florous; pedicels 0.9—1.2 cm long, pubescent as are flower buds and ovary; flower characteristics rather variable; *fruit* with a brown-golden velvet indumentum.

MALAY PENINSULA. Penang, Government hill near turn off to Cray Holet: *Ridley s.n.* (BM), fl. III 1915; ibidem, highlands: *Ridley s.n.* (BM), fl.; Highland Res.: *Curtis 3531* (SING), X 1900; ibidem, Government hill: *Curtis 1451a* (*lectotype* of *Bassia curtisii*) (SING), III 1893; ibidem: *Curtis 1451b* (SING), fr. VIII 1901; ibidem: *Curtis 3536* (SING), fl. VI 1900; ibidem: *Curtis 1451c* (SING), fl. V 1893; ibidem: *Curtis 1451d* (SING), fl. IV 1901; ibidem: *Curtis 1451e* (SING), fl. fr. III 1888; ibidem: *Curtis 1451f* (SING), VII 1893; ibidem: *Curtis s.n.* (SING), X 1900; Perak, Lahat, Waterfall hill behind Taipeng: *Mme Errington de la Croix 62* (*type spec.* of *G. chrysocarpa*) (L, P), fl. II; ibidem: in *Herb. L. Pierre 6122* (P); Taipeng: *De Zylva 9609* (SING), fr. XII; Larut hills: *Derry* (*Curtis 3695*) (SING), fr. IX 1900; ibidem, fr. IX 1901; Taipeng, Waterfall hill: *Wray 512* (SING), fl. s.d.; ibidem, *coll.?* (SING).

BORNEO. Pamankat, Paloh: *NIFS bb. 11366* (L), fr..

Remarks: Judging from leaf nervation and fruit characters this species is undoubtedly a *Ganua*. The flowers, however, are rather variable, also in important features: corolla lobes 8—10, stamens 16—22, ovary cells 8(—10). The latter are mostly distinctly imperfect (cf. Dubard 1908a, b) and the ovary is gradually contracted into the style. In some specimens, however, (e. g. *Curtis 1451d*, Penang highlands, April 1901) the cells are perfectly closed, the ovary being moreover swollen and contracted rather abruptly into the style; this is more like *Madhuca*. Similar indications of a vague generic delimitation are revealed by *Ganua kingiana* (see there). As to other characters (such as leaf nervation, pericarp, etc.), however, the specimens with perfect and those with imperfect ovary cells are fully identical.

Ganua chrysocarpa, long the name of an incompletely known species could be definitely disposed of, after comparing the types from Paris and Singapore, *curtisii* K. & G. (1905) having the priority over *chrysocarpa* Pierre ex Dubard (1908).

Large tree, leaves dark green, petals greenish or white, fruit reddish brown, latex bluish, at first very sticky. Mme Errington de la Croix reports that the latex (gutta ganu) is used for falsifying the economically valuable latex exuded by other Sapotaceae (gutta terbu; we were not able to identify this name with any of the known species).

Vernac. names: mentua tabau (Taipeng), sanggai ketiau (Pamankat). *Habitat:* frequently reported from hills in the Malay Peninsula in alt. of 50 up to 800 m. In Borneo collected at 4 m alt.

12. **Ganua coriacea** Pierre ex Dubard, Bull. Mus. Hist. Nat. XIV, 1908, 408; Lam 1925, 121, fig. 35; Lam 1927, 424.

Type specimen: *Beccari 3085.*

Distribution: E. Sumatra, Riau, W. Borneo (Sarawak).

Terminal bud small, without distinct stipular organs; *leaves* more or less together in apical region of branchlets but not crowded, apex rounded; *inflorescences* in axils of leaves or their scars; *flowers* with characteristic and dense tufts at tips of sepals.

SUMATRA. East Coast, Labuhanbatu, Sei Palas: *NIFS bb. 11490* (L), fl. VI; ibidem, Pasar Tiga: *NIFS bb. 11487* (L).

RIAU. Belimbing: *NIFS bb. 28484* (L).

BORNEO. Sarawak, Kuching: *Beccari 3085* (*type spec.*) (FI, P), fl. I; ibidem: *Haviland 2118* (BM, L, W), fl. I; ibidem: *Haviland 2139* (BM, L), fl. I; ibidem, Entayut riv.: *Hose 413* (BM), fl. XII.

Remarks: A large tree, about 30 m high, knee roots are reported from Sumatra (*NIFS bb. 11487*), latex white and abundant, flowers white and fragrant. The Sumatra, Riau and Borneo specimens, are more or less identical. So far this species was only known from Borneo.

Vernac. names: majang pinang, kenari (Sumatra). *Habitat:* collected in alt. of 5 and 6 m.

13. Ganua obovatifolia (Merrill) Van den Assem, comb. nov. — *Bassia obovatifolia* Merrill, Phil. Journ. Sci. Bot. X, 1915, 57 — *Madhuca obovatifolia* (Merr.) Merrill, Enum. Phil. Flow. Pl. III, 3, 1923, 277; Lam 1925, 180; Lam 1927, 462.

Type specimen and basonym: *Alvarez 21426,* type of *Bassia obovatifolia.* — *Fig. 11.*

Distribution: Luzon.

Terminal bud small without stipular organs; *leaves* in apical region of branchlets but not crowded, ovate, apex rounded, base cuneate, decurrent; petioles 1.0—1.5 cm long, flattened above, convex below, dark at base, glabrous; blade 6—13 by 3—7.2 cm, glabrous on either side, distinctly coriaceous, reddish-brown when dry; midrib prominulous above, slightly but distinctly prominent below; secondary nerves 8—10, not quite conspicuous above at least near margin, slightly but distinctly prominulous below, archingly joined near margin, starting from midrib at angles of about 60°, straight, curving towards apex near margin; tertiary nerves hardly conspicuous, more or less parallel to secondary ones near midrib, reticulate near margin; *inflorescences* in lowest part of leaf region and below it, 5—7-florous; pedicels 1.0—1.8 cm long, about 0.8 mm in diam., glabrous; *sepals* 0.45—0.50 cm long, more or less ovate, not or hardly acuminate at apex, rather thick and almost glabrous with some scattered dark hairs which are somewhat densier towards apex so as to form a small dark tuft, inner sepals with thinner margins, fringed; *corolla* tube 0.25 cm long, glabrous except in throat, lobes 8, 0.25 cm long, more or less ribbon-shaped, pubescent on both sides of rounded apex; *stamens* 15, filaments short and more or less cylindrical, anthers about 0.2 cm with rather blunt apex, not conspicuously mucronate, pilose on dorsal side, thecae oblong; *pistillum* 1.1 cm long, ovary glabrous except for a few hairs at base, 0.13 cm in diam., imperfect cells 5—6; *fruits* 2 cm long, pericarp thin, glabrous, seeds oblong, testa thin, albumen membranous; pedicels 2.2 cm long, under sepals 0.25 cm in diam., woody as are the persistent sepals.

PHILIPPINES. Luzon, Tayabas, Guianayangan: *Escritor 20769* (BM, L, NY, P), fl. III; ibidem, Camarines, near Deat: *Alvarez 21426 (type spec.)* (P), fr. V; ibidem: *Alvarez 21454* (L), fr. V.

Remarks: The leaves of *Alvarez 21454* are less reddish than those of the type. Merrill (l. c. 1915) supposes an affinity to *Madhuca (Bassia)* *coriacea* (Merr.) Merr. (*10008*, Principe, l. c.), an opinion I was unable to check. An affinity to any other *Ganua* species is not clear, except that the leaves of *G. obovatifolia* resemble those of *G. coriacea* in shape. In more important details, however, such as nervation, there is no clear relation.

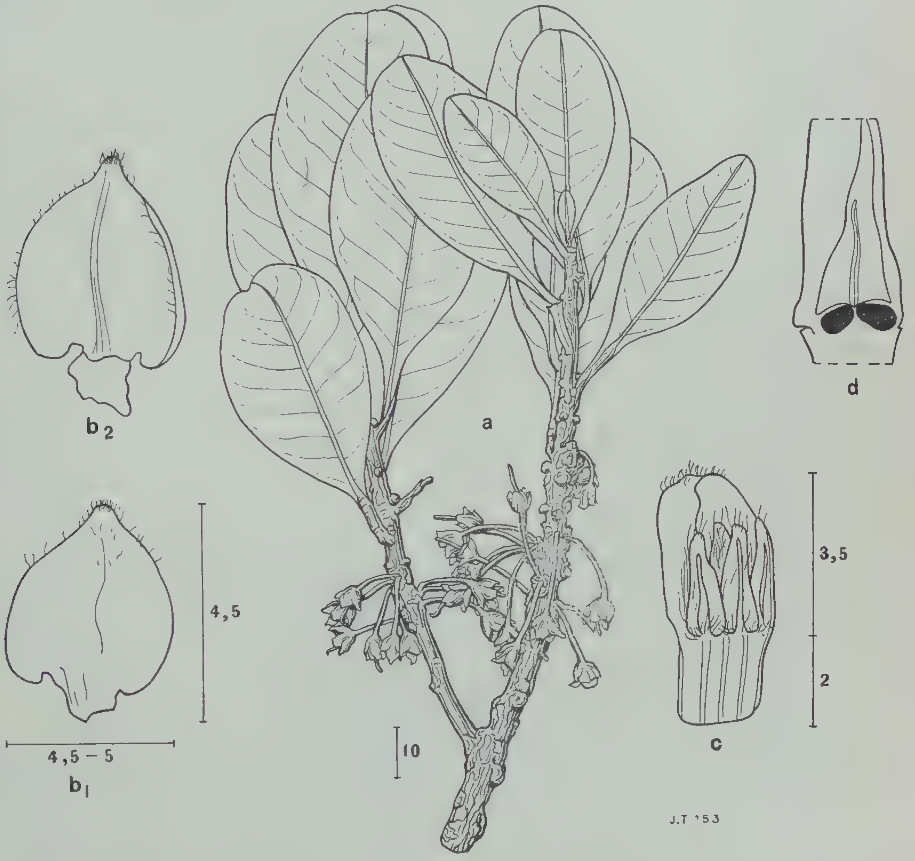


Fig. 11. *G. obovatifolia* — a. branchlet with leaves and flowers; b. 1. outer sepal outside; b.2. inner sepal outside; c. part of corolla and stamens inside; d. longitudinal section of ovary. From *Escritor 20769*. Dimensions in mm.

14. Ganua pachyphylla (Krause) H. J. Lam, Blumea VI, 3, 1952, 592 (excluded from *Burckella*) — *Illipe pachyphylla* Krause, Engl. Bot. Jahrb.

58, 1923, 467 — *Burckella pachyphylla* (Krause) H. J. L., Enum. Sap., Nov. Guinea XIV, 4, 1932, 555, Tab. CI.

Type specimen and basonym: *Ledermann 9633,* type of *Illipe pachyphylla.* Since the Berlin type specimen has been destroyed I propose that the type duplicate in Herb. Kew serve as a lectotype.

Distribution: N. New Guinea.

In addition to Krause's rather incomplete description some further details may follow here, taken from the Kew specimen.

Terminal bud small; no distinct stipular organs; *leaves* scattered along branchlets, obovate to oblong, apex not or hardly acuminate, base broadly cuneate, slightly decurrent; petioles 2.0—3.0 cm long, cylindrical, somewhat incrassate at base, glabrous; blade 14.7—17 by 6.6—8 cm, entirely glabrous; midrib moderately prominent on either side, almost flat above at base; secondary nerves 12—14, prominent only below, starting from midrib at angles of 50°—85°, straight until halfway the margin where curving upwards, tangential to margins, not mutually archingly joined; tertiary nerves not conspicuous, near margin widely reticulate with a tendency to transversal; *inflorescences* up to 6-florous, in axils of leaves or their scars; pedicels 2.2—3.2 cm long, about 0.12 cm in diam., glabrous; sepals oblong to ovate, glabrous, outer ones about 0.6 cm long, 0.4 cm wide, conspicuously broadly acuminate, a small tuft of hairs at apex, inner ones thinner, especially towards margins, more rounded; *corolla* and *stamens* unknown; *ovary* glabrous, cells 5—6, imperfect, internal space considerable; *fruit* unknown.

NEW GUINEA. Sepik, April River: *Ledermann 9633* (*lectotype*) (K), old fl. XI.

Remarks: This species combines *Ganua* characters (ovary, arrangement of inflorescences, sepals) with features of *Burckella* (number of ovary cells, leaf nervation). A tree, 20—25 m high. *Habitat:* in dense wet jungle, alt. 200—400 m.

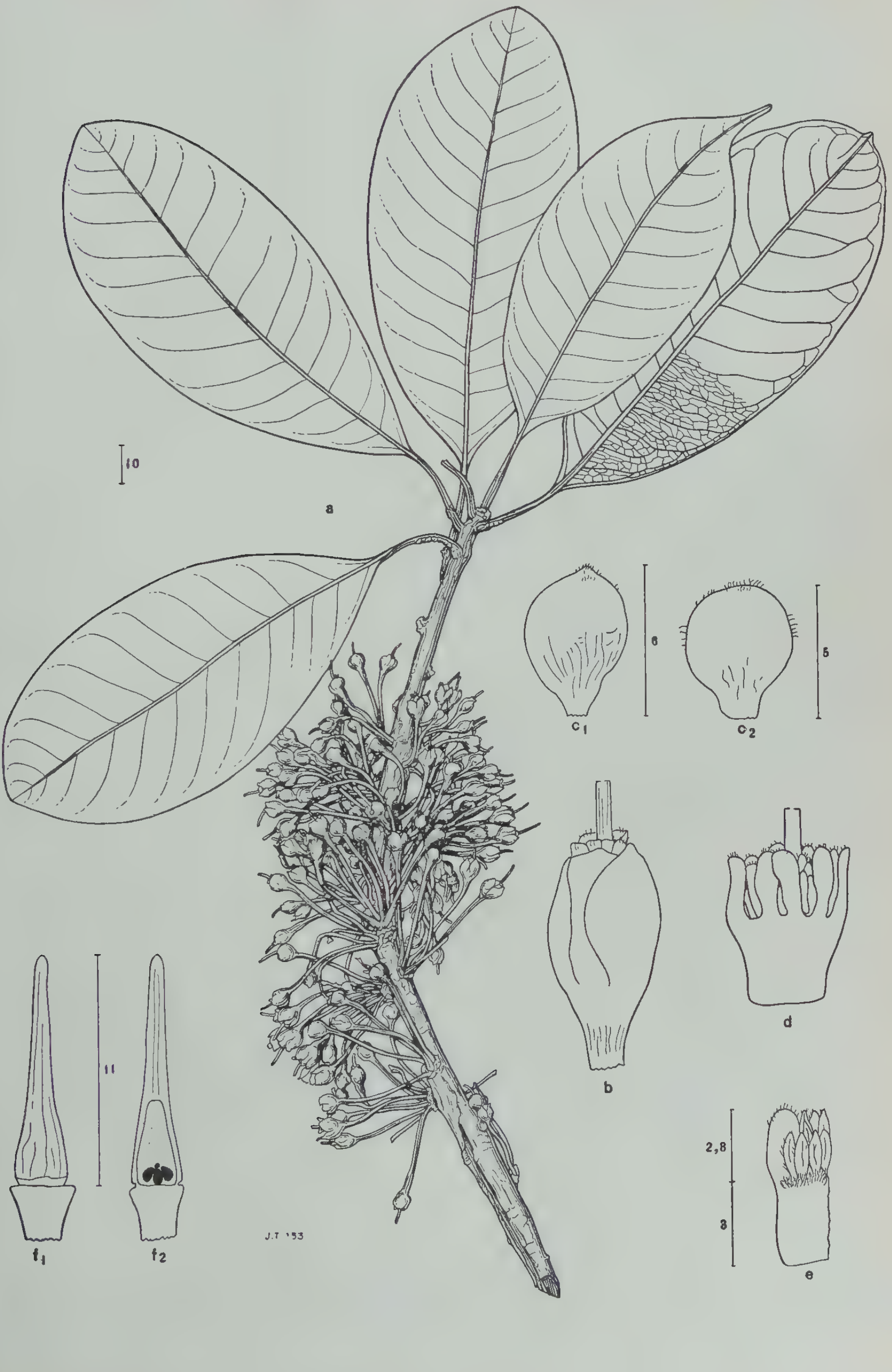
15. Ganua pierrei, spec. nov..

Type specimen: *Haviland & Hose 3482 A.* — *Fig. 12.*

Distribution: W. Borneo.

Arbor; *gemma terminalis* parva estipulata; *folia* in regione terminali ramulorum dispersa, oblonga vel obovata, apice plus minusve late acuminata, basi cuneata, non decurrentia; petioli 1.8—2.8 cm longi, basi paulo incrassati, subtus convexi, apice supra distincte et latius sulcati; lamina 10.5—15.5 × 4.2—6.2 cm, utrimque glabra, distincte coriacea; costa subtus prominens, supra paulo prominens vel plana; nervi secundarii 11—17, graciles, subtus prominentes, supra plani, angulo 60°—80° de costa adscendentes, marginem versus distincte arcuatim coniuncti; nervi tertiarii nervi secundariis similes, prominentes, plerumque ad marginem plus minusve reticulati; *inflorescentiae* sub foliorum regione confertae, 6—12-florae, axillis cicatricium foliorum insertae; pedicelli 2.8—3.5 cm longi, apice incrassati, glabri;

Fig. 12. *G. pierrei* — a. branchlet with leaves and flowers; b. flower; c. 1. outer sepal outside; c. 2. inner sepal outside; d. corolla outside; e. part of corolla and stamens inside; f. 1. ovary and style; f. 2. longitudinal section of ovary. From *type specimen.* Dimensions in mm.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sepala 0.5 cm longa, 0.3—0.5 cm lata, exteriora ovata vel late triangularia, orbicularia, intus glabra, marginibus vix tenuioribus fimbriatis; *corollae* tubus fauce pilosissimus, ceterea glaber, lobi 8—(12), taeniiformes, glabri, apice obtusi quam basi paulo latiores utrimque sericeo-pubescentes; *stamina* 16—22—24, biseriata, filamenta in alabastro dense pubescentia, adulta 0.15 cm longa vix pilosa, antherae 0.15—0.2 cm longae, breviter acuminatae; *pistillum* 1.0 cm longum, ovarium glabrum, loculi 8—12, septis angustis, spatium supra placentam magnum; *fructus* ignoti.

Tree, *terminal bud* rather small, without stipular organs; *leaves* together in apical part of branchlets, not crowded, oblong to obovate, at apex rather bluntly acuminate, base cuneate, not decurrent; petioles 1.8—2.8 cm long, somewhat swollen and dark at base, convex below, at apex above distinctly and rather broadly furrowed, the groove growing flattened downwards; blade 10.5—15.5 by 4.2—6.2 cm, entirely glabrous on either side, distinctly coriaceous; midrib prominent below, subprominent or flat above; secondary nerves 11—17, slender, prominulous below, flat above, starting from midrib at angles of 60°—80°, straight up to margin, close to it conspicuously archingly joined; tertiary nerves slender, as much prominulous as secondary ones, several of them starting from midrib almost parallel to secondary ones, more or less reticulate, particularly near margin; *inflorescences* rather close together below leaf region, 6—12-florous, in axils of leaf scars; pedicels 2.8—3.5 cm, incrassate below flowers, glabrous; *sepals* 0.5 cm long, 0.3—0.5 cm wide, outer ones ovate to broadly triangular, glabrous, apex with tuft of dark hairs, inner ones almost circular, fringed margins not distinctly thinner, glabrous within; *corolla* tube with villous throat, glabrous without, lobes 8(—12), ribbon-shaped, tips rounded and slightly wider than at base, sericeously pubescent on either side at apex, for the rest glabrous; *stamens* 16—22—24, biseriate, filaments densely pubescent in bud, adult ones 0.15 cm long with some long hairs, anthers 0.15—0.2 cm with short acumen; *pistillum* 1.0 cm long, ovary glabrous, 8—12-celled, septa narrow, leaving a considerable space above placenta; no *fruit* seen.

BORNEO. Sarawak, Kuching: *Haviland & Hose 3482 A* (*type spec.*) (L), fl. I; ibidem: *Haviland & Hose 3482 B* (BM), fl. I; ibidem: *Haviland & Hose 3481 B* (BM), fl. I; ibidem: *Haviland & Hose 3481 E* (L), fl. I.

Remarks: A small tree, flowers white. Regarding nervation characters this species seems related to *G. monticola*. However, the flowers of the latter are unknown and of the present species I have seen no fruits. The differences refer to the arrangement and rigidity of leaves, the length and shape of the petiole, the length of the pedicels and the arrangement of the inflorescences. Named in honour of L. Pierre who laid the foundations of generic delimitations in the *Madhuceae*.

16. Ganua daemonica, spec. nov..

Type specimen: *Egar A 0932. — Fig. 13.*

Distribution: W. Borneo.

Arbor; *gemma terminalis* parva estipulata; *folia* in regione terminali ramulorum dispersa, elliptica, apice perconspicue acuminata, basi late cuneata, paulo decurrentia; petioli 1.6—2.5 cm longi, subcylindrici, apice

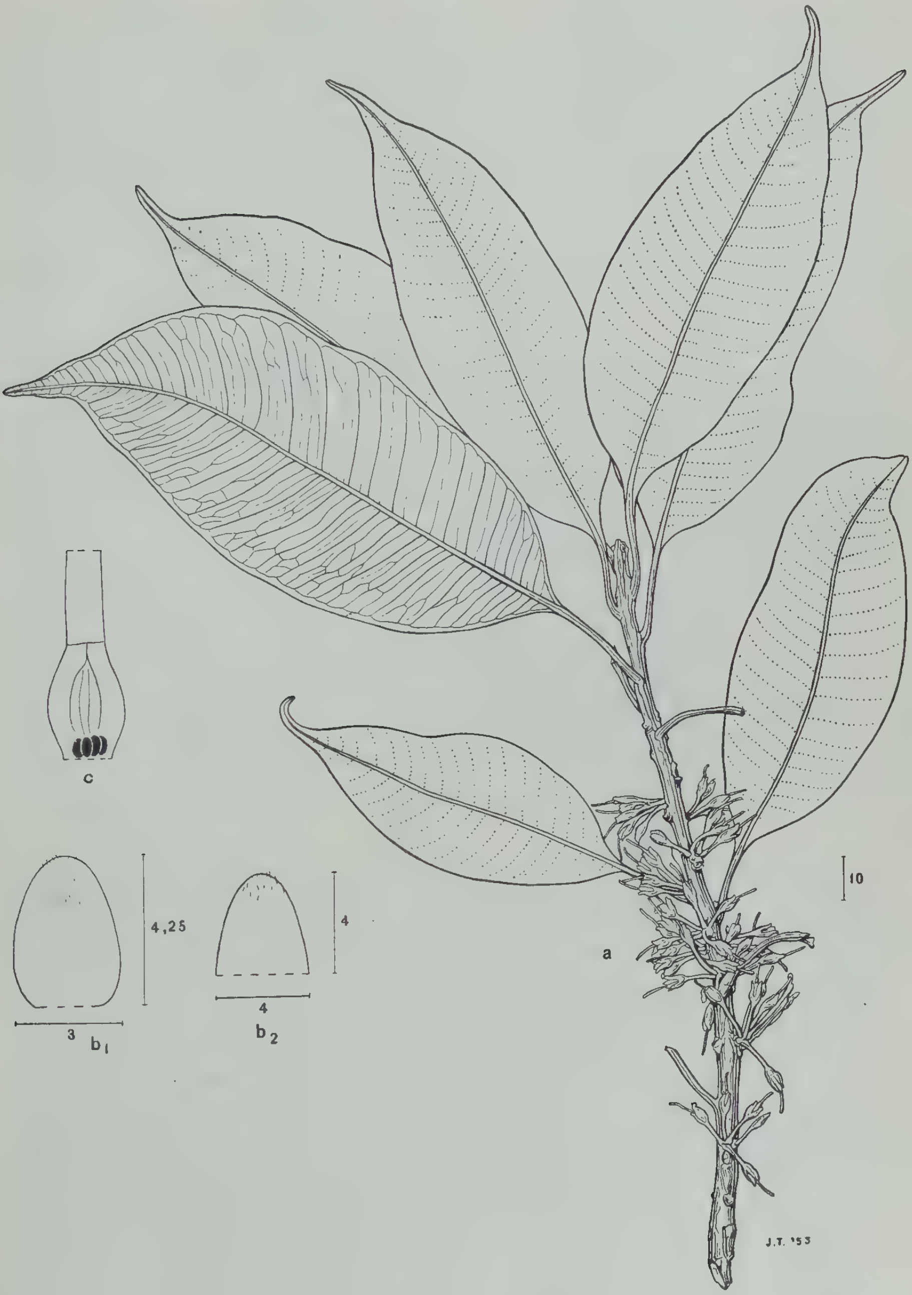

Fig. 13. *G. daemonica* — a. branchlet with leaves and flowers; b. 1. outer sepal outside; b. 2. inner sepal outside; c. longitudinal section of ovary. From *type specimen*. Dimensions in mm.

subtus plani, fusci, laeves, glabri; lamina 10.9—15.5 × 3.9—6 cm, utrimque glabra, distincte coriacea; nervi secundarii 14—20, supra plani, subtus paulo sed distincte prominentes, angulo 70°—80° de costa adscendentes, marginem versus distincte arcuatim coniuncti; nervi tertiarii graciles sed conspicui, secundariis distincte paralleli, prope marginem paulo reticulati; *inflorescentiae* superiores in axillis foliorum, ceterae sub foliorum regione insertae, 4—7-florae; pedicelli 0.6—0.9 cm longi, circiter 0.1 cm diam., paulo adpresse pubescentes; *sepala* 3.5—4.25 mm longa, ovata, basi lata, apice plus minusve rotundata nonnullis pilis fuscis et rigidis haud cirrosis suffulta, praecipue interiora extus parte media sericeo-pubescentia; *corolla* et *stamina* ignoti; *pistillum* 1.0—1.2 cm longum, ovarium glabrum, loculis 8 imperfectis; *fructus* ignoti.

Tree; *terminal bud* small, without stipular organs; *leaves* scattered in apical region of branchlets, elliptic, apex conspicuously acuminate, base broadly cuneate and slightly decurrent; petioles 1.6—2.5 cm long, more or less cylindrical, flattened above at apex, dark and smooth, glabrous; blade 10.9—14.5 by 3.9—6 cm, distinctly coriaceous, entirely glabrous on both sides; secondary nerves 14—20, flat above, little but conspicuously prominent below, starting from midrib at angles of 70°—80°, straight, distinctly archingly joined near margin; tertiary nerves slender but conspicuous, distinctly parallel to secondary ones, somewhat reticulate near margin; *inflorescences* in lower part of branchlets, uppermost ones in axils of leaves, 4—7-florous; pedicels 0.6—0.9 cm long, about 0.1 cm in diam., somewhat appressedly pubescent; *sepals* 3.5—4.25 mm, ovate, base broad, apex more or less rounded with some dark and stiff hairs, not distinctly tufted, especially inner ones sericeously pubescent in their central part outside; *corolla* and *stamens* unknown; *pistillum* 1.0—1.2 cm long; ovary glabrous, cells 8, imperfect.

BORNEO. Sarawak, Setapok for. res.: *Egar A 0932* (*type spec.*) (KEP), old fl. III.

Remarks: small tree, 13 m high.

Vernac. name: ketio hantu; *daemonica* is a translation of the Malay 'hantu' which means demon of ghost. Regarding nervation characters a relation may be supposed to *G. motleyana, G. curtisii* and *G. coriacea.*

17. **Ganua orientalis,** spec. nov..

Type specimen: *Brass 7747. — Fig. 14.*

Distribution: New Guinea.

Arbor?; *gemma terminalis* paulo conspicua, paucis perulis triangularibus glabris estipulatis; *folia* dispersa, elliptica, apice conspicue acuminata, basi cuneata, paulo decurrentia; petioli 1.1—1.7 cm longi, basi fusci et interdum subrugosi, supra plani, subtus convexi, glabri; lamina 7.2—9 2 × 2.7—3.1 cm, utrimque glabra; nervatio typi *G. boerlageanae*; costa utrimque paulo prominens; nervi secundarii 17—19, graciles, subtus subprominentes,

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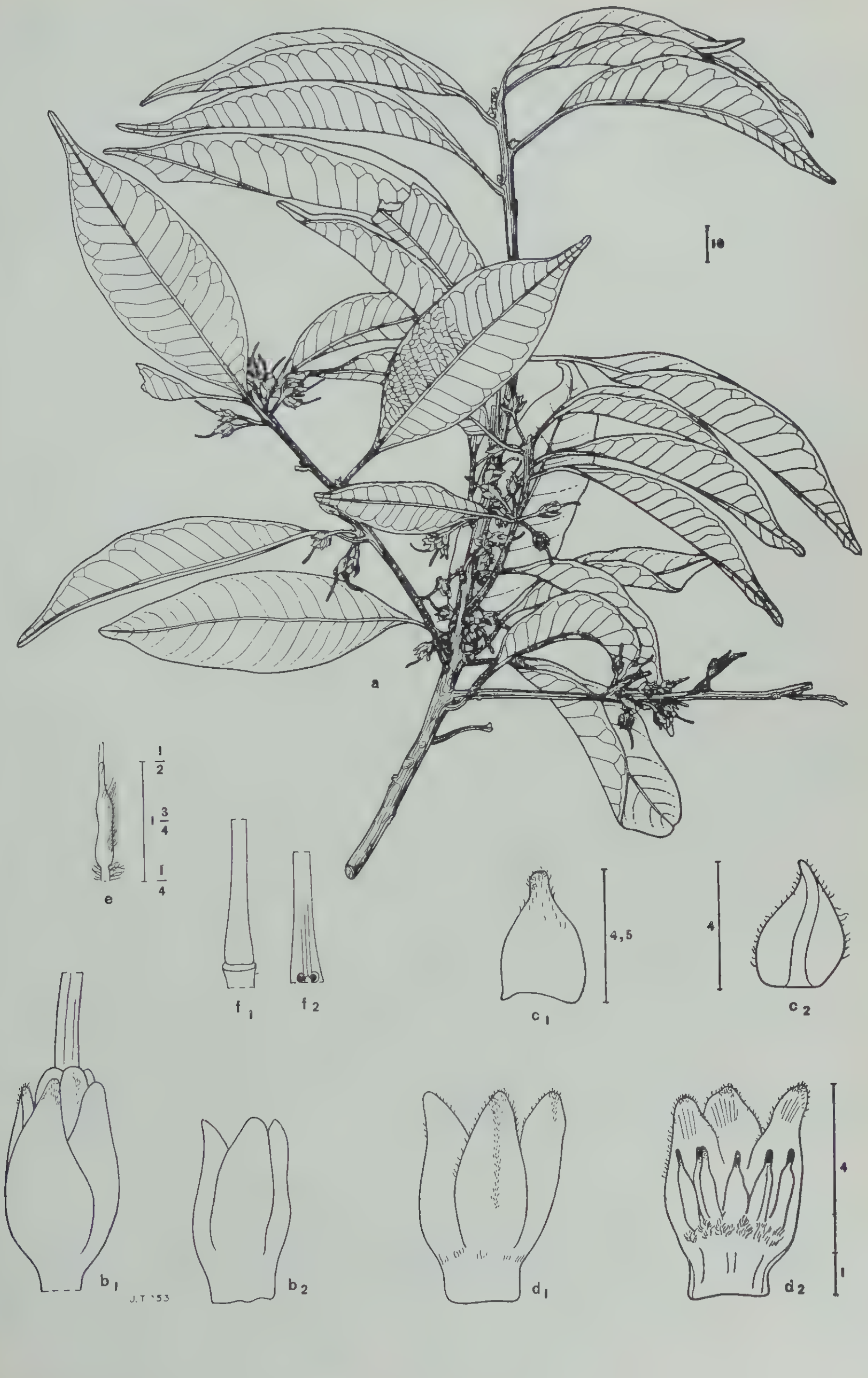
Fig. 14. *G. orientalis* — a. branchlet with leaves and flowers; b. flower; c. 1. outer sepal outside; c. 2. inner sepal outside; d. 1. corolla outside; d. 2. corolla and stamens inside; e. stamen; f. 1. ovary and style; f. 2. longitudinal section of ovary. From *type specimen.* Dimensions in mm.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supra vix prominuli vel paulo impressi, angulo 70°—80° de costa adscendentes, apicem versus curvati, prope marginem confluentes; nervi tertiarii reticulati, pergraciles vel vix conspicui, subtus tantum subprominuli, prope costam nonnulli nervis secundariis plus minusve parelleli; *inflorescentiae* in axillis foliorum et eorum cicatricium insertae, 4—6-florae; pedicelli 0.5—0.8 cm longi, sub flore 0.1 cm diam., glabri, interdum nonnullis pilis rigidis muniti; *sepala* 0.45 cm longa, subovata, apice cirro minuto pilorum rigidorum suffulta, pilis similibus secundum margines et in linea media in parte apicali, praecipue sepala interiora sericeo-pubescentia marginibus subglabris fimbriatis exceptis; *corollae* tubus adultae circiter 0.1 cm longus, fauce pubescens, extus glaber, lobi 8, circiter 0.4 cm longi, apice acuti, glabri, pilis utrinque apicem versus exceptis; *stamina* 16, plus minusve biseriata, filamenta lata et brevia, 0.25—1 mm longa, pilosa, thecae 1.75 mm longae, oblongae, pilosae, connectiva circiter 0.5 mm longa, mucronata, pilosa; *pistillum* 1.2 cm longum, ovarium glabrum in stylum contractum, loculi 6—8 imperfecti, spatium supra placentam parvum; *fructus* ignoti.

Tree?; *terminal bud* with small triangular, glabrous scales, rather inconspicuous, without stipular organs; *leaves* scattered along branchlets, elliptic, apex very conspicuously acuminate, base cuneate, slightly decurrent; petioles 1.1—1.7 cm long, base dark and sometimes slightly rough, flattened above, convex below, glabrous; blade 7.2—9.2 by 2.7—3.1 cm, entirely glabrous on either side; nervation of *G. boerlageana* type; midrib little prominent on either side; secondary nerves 17—19, rather slender, prominulous below, hardly so above or slightly impressed, starting from midrib at angles of about 70°—80°, more or less straight, near margin curving upwards and joining; tertiary nerves very slender to hardly conspicuous, only prominulous below, more or less reticulate, some nerves adscending more or less parallel to secondary ones, loose reticulation all over the leaf; *inflorescences* inserted in axils of leaves or their scars, 4—6-florous; pedicels 0.5—0.8 cm long, just below flower 0.1 cm in diam., glabrous, sometimes with some hairs; *sepals* 0.45 cm long, more or less ovate, apex with a tiny tuft of stiff hairs, some of same type also found along margins and on the median line near apex, especially inner sepals sericeously pubescent, except for the subglabrous, fringed margins; *corolla* tube in open flower about 0.1 cm long, throat pubescent, glabrous without, lobes 8, about 0.4 cm long, acute at apex, glabrous except for some hairs at apex within and without; *stamens* 16, more or less biseriate, filaments relatively short and broad, 0.25—1 mm long, pilose, thecae 1.75 mm long, oblong, pilose, connectivum about 0.5 mm long, mucronate, pilose; *pistillum* 1.2 cm long, ovary glabrous, gradually contracted into style, cells 6—8, imperfect septa leaving little space above placenta; no *fruit* seen.

NEW GUINEA. Middle Fly River, Lake Daviambu: *Brass 7747 (type spec.)* (L), fl. IX.

Remarks: Regarding its nervation this species is undoubtedly related to *G. boerlageana*. It differs mainly in the shape of the leaf, prominence of secondary nerves, length of pedicels and shape of corolla lobes.

18. Ganua nov. spec.?

RIAU. Sinkep, Djago: *NIFS bb. 3940.*

Though probably a *Ganua*, this sterile specimen could not be identified with one of the known species. It resembles *G. fusca* in the shape of the leaves, the nervation characters and the pubescence of the leaves below, but it is distinctly different by the absence of distinct scales in the terminal bud. On the other hand, there are distinct scars of stipular organs at the base of the petioles, but the leaves are shining above (in *G. fusca* dull), densely chocolate-coloured (not ferruginous), and woolly (not tomentose) below; the secondary nerves are more numerous (17—22) than in *G. fusca* (12—16) and more straight. Some dimensions are: leaves 8.4—12.6 × 4.3—6.2 cm; petioles 1.9—2.4 cm.

Vernac. name: lakis. *Habitat:* alt. 10 m.

Excluded species.

Ganua ligulata H. J. L., in Lam 1927, 426, fig. 10, transferred to **Madhuca ligulata** (H. J. L.) H. J. L., nov. comb.

Collectors' numbers.

Species have been indicated by their number between brackets.

Abar bin Adan 2022 (8), 2340 (8); Aet & Idjan (Van Dijk) 871 (9), 911 (9); Alvarez 21426 (13), 21454 (13); Anta (Kostermans) 146 (8), 157 (8), 319 (8); Apostal 22 (6?).

Baring Gould S 22 (8); Beccari 2241 (7), 2446 (3), 2958 (7), 3085 (12), 3105 (4), 3503 (1); Brass 7747 (17); Burck s.n. (5), s.n. (9); Buwalda 29 (NIFS bb. 32406) (8), 7840 (8), 7850 (8).

Comer s.n. (2); Curtis 1451a (11), 1451b (11), 1451c (11), 1451d (11), 1451e (11), 1451f (11), 3531 (11), 3536 (11), 3695 (11), s.n. (11).

Delmaar 2329 (10); Denny s.n. (8); Van Dijk (see Aet & Idjan).

Egar A 0932 (16); Elmer 21571 (2); Endert 356 (8), 5087 (8); Errington de la Croix 62 (11); Escritor 20769 (13); Eyma 3050 (9).

FB (Manila) 22498 (6?), 27903 (6?); FD (Singapore) 592 (8), 1026 (8), 1918 (8), 2308 (8), 4840 (2), 5896 (8), 6496 (8), 8974 (8), 17225 (8), 27073 (8), 29626 (8), 29960 (8), 32154 (8), 32253 (8), 34107 (8), 40685 (8), 40713 (8), 41572 (8), 43195 (8), 43301 (8), 43689 (8), 44785 (8), 65673 (8), 65692 (8).

Garaman 2311 (6?), 2789 (6?); Grashoff s.n. (8); 765 (8); Griffith s.n. (8).

Haviland 2118 (12), 2318 (4), 2319 (12), 3481 B (15), 3481 E (15); 3482 A (15); 3482 B (15); Hose (see Haviland), 413 (12).

Idjan (see Aet).

Kadir A 609 (2); King's coll. 3414 (2), 3678 (2), 5454 (8); Korthals s.n. (8); Kostermans (cf. also Anta) 18 (= NIFS bb. 33956) (8), 21 (= NIFS bb. 33959) (8); Kwan Ting A 354 (8).

Lam 3541 (9); Ledermann 9633 (14); Lörzing 6823 (5).

Merrill 9622 (6); Motley 857 (8).

NIFS bb.-numbers 2022 (8), 2364 (8), 3940 (18), 4939 (8), 5382 (8), 5474 (8), 6341 (2), 6359 (8), 7797 (8), 9968 (8), 10100 (9), 10105 (9), 10661* (8), 11337* (8), 11366 (11), 11487 (12), 11490 (12), 12206* (8), 12210* (8), 12470* (8), 12478* (8), 12842 (8), 12924* (8), 12928* (8), 13136* (8), 13482* (8), 13649* (8), 13795 (8),

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* Not seen by me personally but based upon annotations by Lam.

13834* (8), 14412* (8), 14579* (8), 15076 (8), 15460 (8), 15487 (8), 15689 (8), 16042 (8), 16757 (8), 16821 (8), 16997 (8), 17773 (8), 17829 (8), 17861 (8), 18139 (8), 18263* (8), 18999 (4), 20060 (9), 21264 (8), 21821 (9), 24020 (8), 24021 (8), 24662 (8), 24664 (8), 24665 (8), 25559 (8), 25976 (9), 27757 (8), 28082 (8), 28083 (8), 28484 (12), 28904 (9), 29094 (8), 29906 (9), 30263 (9), 30340 (8), 30372 (9), 30739 (9), 30753 (9), 30860 (9), 30886 (9), 30892 (9), 30893 (9), 30936 (9), 30957 (9), 30958 (9), 30972 (9), 32406 (8), 33048 (8), 33064 (8), 33956 (8), 33959 (8).

Ridley 5076 (10), 5645 (8), 6238 (2), 13489 (8), s.n. (11), s.n. (11), s.n. (2), s.n. (8); Riedel s.n. (8); Van Romburgh 78 (5).

Teysmann 5652 (9), 7818 (9), 11099 (8), s.n. (8), s.n. (8).

Versteegh s.n. (8), De Vriese 3748 (8).

Wood 1261 (6?), 1889 (6?); Wray 512 (11).

Zakaria b. Sulong s.n. (8); De Zwaan s.n. (4); De Zylva 9609 (11).

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New species, new varieties and new combinations are denoted by an asterisk; accepted taxa are in roman, synonyms in italics. Numbers are those of species in the text.

Bassia curtisii K. & G. 11; *monticola* Merr. 6; *obovatifolia* Merr. 13; *pallida* Burck 5.

Burckella *pachyphylla* (Krause) H. J. L. 14.

Ganua *attenuata* H. J. L. 4; beccarii Pierre ex Dubard 7; boerlageana (Burck) Pierre ex Dubard 9; ditto, var. boerlageana 9; ditto, *var. latifolia Van den Assem 9; *chrysocarpa* Pierre ex Dubard 11; coriacea Pierre ex Dubard 12; curtisii (K. & G.) H. J. L. 11; *daemonica Van den Assem 16; *elongata* Pierre 3; *euphlebia* Merr. 2; fusca (Engler) Merr. 1; *glaberrima* (H. J. L.) H. J. L. 2; *glabrescens* Pierre 4; *kingiana (Brace) Van den Assem 2; ditto, *var. euphlebia Van den Assem 2; ditto, var. kingiana 2; *ligulata* H. J. L. excl.; *monticola (Merr.) H. J. L. 6; motleyana (de Vriese) Pierre ex Dubard 8; ditto, var. motleyana 8; ditto, var. scortechinii K. & G. 8; *obovatifolia (Merr.) Van den Assem 13; *orientalis Van den Assem 17; pachyphylla (Krause) H. J. L. 14; pallida (Burck) H. J. L. 5; *pierrei Van den Assem 15; prolixa Pierre ex Dubard 3; sarawakensis Pierre ex Dubard 4; *scortechinii* (K. & G.) H. J. L. 8; sessilis (K. & G.) H. J. L. 10.

Illipe fusca Engler 1; *pachyphylla* Krause 14.

Madhuca *glaberrima* H. J. L. 2; *kingiana* (Brace) H. J. L. 2; *ligulata (H. J. L.) H. J. L. sub spec. excl.; *monticola* Merr. 6; *obovatifolia* Merr. 13.

Payena *boerlageana* Burck 9; *sessilis* K. & G. 10.

REVISION OF THE SAPOTACEAE OF THE MALAYSIAN AREA IN A WIDER SENSE

V [1]). Manilkara Adanson em. Gilly in the Far East

by

P. VAN ROYEN

(Rijksherbarium, Leiden)

(Issued 18. XII. 1953)

Manilkara Adanson em. Gilly, Trop. Woods 73, 1943, 1—22 — *Manilkara* Adanson, Fam. 2, 1763, 166; Dubard, Ann. Mus. col. Mars. 23, 1915, 6; Baehni, Candollea 7, 1938, 394—508; Lam, Blumea 4, 2, 1941, 323; Lam, Blumea 5, 1, 1942, 41 — *Manilkara* Rheede, Lam in Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 238; Lam, l. c., sér. 3, 8, 1927, 481 — *Manyl-kara* Rheede, Hort. Mal. 4, 1673, 53, t. 25 — *Mimusops* L., sect. *Ternaria* DC., Prodr. 8, 1844, 203; as a subgenus in Engler, Monogr. Afr. Pfl. Fam. und Gatt. 8, 1904, 55 — *Delastrea* A. DC, Prodr. 8, 1844, 195 — *Labramia* A. DC, l. c. 672 — *Mimusops* L., sect. *Euternaria* Engl., l. c., p.p. (except sect. *Muriea*) — *Northia* (not of Hook. f.) sensu Lam, l. c. 1925, 241 and 1927, 481, p.p.; Lam, Bern. P. Bish. Mus. Bull. 141, 1936, 163 — *Northiopsis* Kanehira, Bot. Mag. Tokyo 47, 1933, 677; Lam, l. c. 1941, 343; Lam, l. c. 1942, 43 — *Faucherea* Lec., Bull. Mus. hist. nat. 26, 1920, 248 — *Achras* L., Sp. Pl., 1753, App. 1190; Loefling, Iter Hisp., 1758, 186; Lam, Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 218; Lam, l. c., sér. 3, 8, 1927, 476; Little, Brittonia 7, 1948, 48.

Laticiferous trees. Leaves alternate, coriaceous, often obovate with rounded tip, stipules caducous; midrib impressed or crested above, prominent below, secondary and tertiary nerves parallel, secondary ones hardly stronger than tertiary nerves, the latter slender, descending from margin, often stretchedly and minutely reticulate. Inflorescences axillary, clustered, manyflorous. Flowers hermaphrodite, pedicellate, pedicel often incrassate when fruiting. Calyx with 2 whorls of 3 lobes each. Corolla with 6 lobes, each of them with 2 dorsal or lateral segments which are sometimes reduced or wanting. Stamens 6, epipetalous, inserted in the row of the staminodes, anthers dehiscing extrorsely. Staminodes 6, petaloid, alternipetalous, ovate, acuminate, usually dentate or lobed. Ovary 6—14-celled, cells 1-ovuled, ovules axile, anatropous to campylotropous. Fruit a dryish berry, 1—6-seeded; seeds compressed to terete, pear-shaped to oblong ellipsoid, scar basiventral or almost basal, large to small, wide to narrow, oblong to linear, with the hilum at the apical and the micropyle at the basal end; testa crustaceous; albumen copious, cotyledons foliaceous, thin, ovate, radicle long exserted, cylindrical.

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[1]) I—III in Blumea VI, 3, 1952, pp. 547—595; IV in the present issue, pp. 364—400.

Type species: *Manilkara kauki* (L.) Dubard.

Distr.: About 75 species in all tropical countries, viz c. 30 in America, c. 35 in the African region and some 15 in Australasia and the Pacific.

In 1941 Lam c.s. published a study on this genus, in which particular reference was made to the Far Eastern species. Since then some important publications on the genus were edited. The most outstanding of these is a paper by Gilly, in which the generic limits were discussed. Gilly's most important conclusion was that *Achras* had to be united with *Manilkara*. The two genera have been placed by Lam, 1939 (Rec. Trav. bot. néerl. 36, 1939, 524) respectively in the subfamily *Sideroxyloideae* (*Achras*) and *Mimusopoideae* (*Manilkara*), but in 1941 both genera were inserted in one tribe *Manilkareae*, including moreover, *Northiopsis* etc. On p. 349 Lam states: "the most striking feature (in the *Manilkareae*) is the tendency of the reduction of both dorsal appendages and staminodes ... Both reductions are, generally speaking, independent from each other. For instance, staminodes are small to very small in *Faucherea, Northiopsis* and *Northia,* wanting in ... and occasionally *Manilkara*". After discussing the relations between *Manilkara, Achras, Northia, Northiopsis* and *Faucherea,* Lam concludes: "These conditions would undoubtedly make us insert *Northiopsis hoshinoi* in *Manilkara,* if not the character of the wanting appendages was, in the case of *Faucherea* (and to a lesser degree also of *Achras)* a justified criterion to keep those genera apart".

Gilly, however, as was said, arrived at the conclusion that *Achras* had to be united with *Manilkara.* As his paper of 1943 does not give full details towards this conclusion, Gilly kindly forwarded us some pictures from his (then unpublished) thesis. From these figures it is obvious that gradating series of his "fusion triads" (= one sepal with 2 appendages) can be established in which the two appendages are being reduced so far as to ultimately leading to the conditions found in the subgenera *Euachras* Gilly and *Nisperoa* Gilly in which no appendages at all are found. By kind consent of the author we are allowed to publish those details in which this series is shown (*Fig. 1*). Because of the intermediate position of the subgenus *Manilkariopsis* (in which the petal is smaller than the two dorsal appendages) we agree that *Achras* cannot be maintained as generically distinct from *Manilkara* sensu stricto.

In a proposal for the conservation of *Manilkara* Adans. (1763) against *Achras* L. (1753) by Lam and van Royen (Taxon 2, 5, 1953, 112) the generic name *Manilkara* has been accepted as the correct name but the Paris Congres of 1954 still has to approve of this proposal. Gilly rejects the name *Achras* L. as a nomen confusum, but it was pointed out by Little (Brittonia 7, 1948, 48) that *Achras* L. has been correctly published and is certainly not a nomen confusum. Its first description has been given by Linnaeus in 1753 and has been emendated by Loefling (Iter Hisp., 1758, 186). On these grounds it became necessary for us to propose the above-mentioned conservation, contrary to Gilly who, in search for the next validly published generic name after *Achras,* found the generic name *Manilkara* and consequently used this name, changing the well-known

Achras zapota L. into *Manilkara zapotilla* (Jacq.) Gilly. When our proposal is accepted the well-known *Achras zapota* L. has to be named *Manilkara zapota* (L.) van Royen.

Extrapolating Gilly's idea about the possible evolution of the "fusion triads" we inserted *Northiopsis* as well as *Faucherea* in *Manilkara*. In *Northiopsis* and *Faucherea* no appendages on the petals are present and we may assume these as being reduced in a trend of evolution from petals with appendages towards those without these appendages (*Fig.* 1).

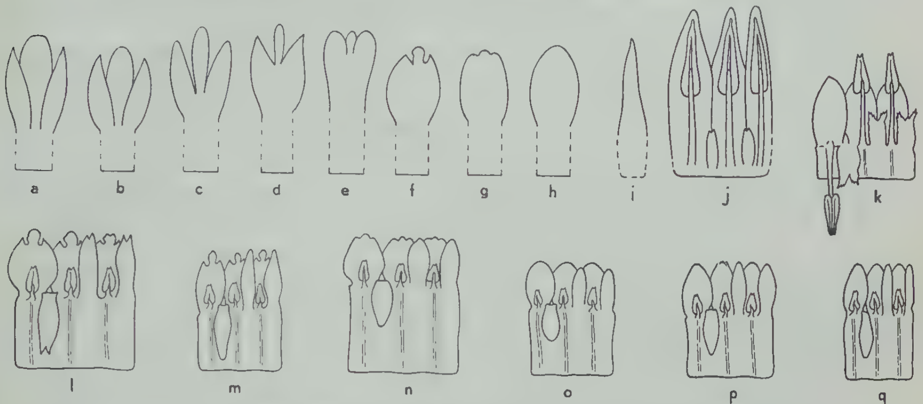


Fig. 1. — a—h. Development of "fushion triads" in the genus *Manilkara,* a—b. subgenus *Eumanilkara,* c—e. subgenus *Manilkariopsis,* f—g. subgenus *Euachras* (including *Achras zapota* L.), h. subgenera *Euachras* and *Nisperoa* — i—j. *Manilkara hoshinoi* (Kan.) van Royen, i. petal outside, j. corolla inside — k. *Manilkara calcicola* Gilly — l—q. variability within *Manilkara zapota* (L.) van Royen, l—m. from Mexico, n—p. from British Honduras, q. from Nicaragua.

Combining these genera with *Manilkara* we do not need to emendate Gilly's concept of *Manilkara* again as in his description the characters of *Northiopsis* and *Faucherea* are included.

Northia seychellana Hook. f., the single species left in *Northia* after excluding *Northia fasciculata* is regarded to constitute a separate genus on account of its exalbuminous seeds, the large scar and its highly reduced staminodes.

Gilly's interpretation and terminology of various flower-parts does not seem an improvement. He distinguished between a 3-merous "calyx" (outer sepals), a 3-merous "corolla" (inner sepals, which are anything but petaloid) and the above-mentioned "fusion triads" (comprising the corolla and its appendages). We see no reason why this terminology should be preferred above the traditional one of a biseriate calyx being found in many Sapotaceous genera.

The Far-Eastern species, including the cultivated *Manilkara zapota,* belong to two subgenera, *Eumanilkara* and *Euachras.* These sections are characterized respectively by petals with appendages and petals without appendages.

In the following the publication of Lam and cooperators in Blumea 4, 2, 1941 is abbreviated as Lam c.s. 1941, and in Blumea 5, 1, 1942, as Lam 1942.

Key to the Far-Eastern species.

1.a. Petals without appendages . . . Subgenus *Euachras* 2

b. Petals with appendages . . . Subgenus *Eumanilkara* 3

2.a. Leaves 9—18.8 × 5.5—9.2 cm; petioles stout, 2.5—4.2 cm; secondary nerves 24—30; petals 1.8—2 cm; anthers 0.5—0.6 cm; ovary 6-celled; seeds c. 3.8 cm. *Samoa and Caroline Islands* . . . . . . **12. M. hoshinoi** (Kan.) van Royen

b. Leaves 5—12 × 1.8—5.5 cm; petioles slender, 1.5—3 cm; secondary nerves 18—21; petals 0.3—0.6 cm; anthers 0.15—0.3 cm; ovary 12—10(—6)-celled; seeds 1.6—2.3 cm. *Cultivated* . . . . . . **13. M. zapota** (L.) van Royen

3.a. Leaves minutely tomentose or sericeous and therefore pale underneath . . 4

b. Leaves entirely glabrous, the two surfaces of the same colour, though sometimes of different shades 7

4.a. Leaves small, 2.5—7.5 × 1.5—3.5 cm, densely crowded at tips of branchlets, with narrow base, petioles 1—2 cm long; fruit not longer than 1 cm, scar on the seed circular. *Pacific Islands*
1. M. dissecta (L. f.) Dubard, var. **pancheri** (Baill.) R. A. Maas Geesteranus

b. Leaves larger, 5—13 × 3.5—8.5 cm, petioles 1.5—5.5 cm 5

5.a. Leaves elliptic-ovate to somewhat obovate, little broader in the upper half, base broadly acute to subrotundate; flowers 0.9—1 cm long, the pistillum 1.5 cm with the style well exserted; petals 0.9 cm, tube 0.3 cm; ovary 9—7-celled. *Fiji*
2. M. smithiana H. J. Lam & R. A. Maas Geesteranus

b. Leaves mostly distinctly obovate with narrow base and broad upper half . . 6

6.a. Leaf-base acute to rotundate, basal angle 75°—180°; nerves ascending at an angle of 60°—70°; flower buds ovoid, 0.6—0.7 cm long, the pedicels not gradually incrassate at top; appendages as long as petals, staminodes 0.35—0.5 × 0.15—0.3 cm; ovary with distinct glabrous annular disc at base, 7—6-celled. *S.E. Asia to Australia* . . . . **3. M. kauki** (L.) Dubard

b. Leaf-base always acute, basal angle 80°—90°; nerves ascending at an angle of 50°—60°; flower buds club-shaped, c. 1 cm, borne upon gradually incrassate pedicels; appendages c. $^{2}/_{3}$ as long as petals; staminodes 0.25—0.4 × 0.1—0.15 cm; ovary without disc, 6-celled. *C. and N. Celebes and Banggai*
4. M. celebica H. J. Lam

7.a. Flowers small, calyx 0.4—0.7 cm long 8

b. Flowers larger, calyx 0.8—1.4 cm long 11

8.a. Secondary nerves, though faint, distinguishable from the tertiary ones and at the margin archingly joined 9

b. Nervation striate, all nerves about as faint, close to the margin united to form a distinct but intramarginal nerve 10

9.a. Leaves 2.5—7.5 × 1.5—3.5 cm, obovate with narrow base; pedicels 1.5—2, in fruit 2.5—3 cm; ovary 6-celled, with glabrous disc; fruit not longer than 1 cm; scar on the seed small and circular. *W. Pacific Islands*
1. M. dissecta (L. f.) Dubard, var. **dissecta**

b. Leaves 3.5—11 × 2.5—6.5 cm, oblong or ellipsoid to subobovate with broad base and a more or less distinctly emarginate tip; pedicels 0.8—0.9 cm; ovary 12—9(—6)-celled, with glabrous disc; fruit 1—1.5 cm long; scar on the seed oblong. *Continental Asia* . . . . **5. M. hexandra** (Roxb.) Dubard

10.a. Staminodes thick and scale-like deltoid or subtruncate with undulate margin, sometimes with 1—3 protracted teeth; fruit c. 1.5 × 1 cm; scar on the seed oblong, 0.8 × 1.8 cm. *Caroline Islands* . . . . . . **6. M. udoido** Kanehira

b. Staminodes membranous, filiform, subulate or ovate to oblong with some teeth, sometimes wanting; fruit 2—3.3 × 1.8—2.1 cm. *Philippines, Celebes, N. Moluccas, New Guinea* . . **7. M. fasciculata** (Warb.) H. J. Lam & R. A. Maas Geesteranus

11.a. Leaves obovate, the base rounded or slightly subcordate, the tip broad and usually emarginate; petioles 1.2—1.8 cm; pedicels 2.5—3.5 cm; appendages as long as the petals, about 0.7 cm. *India* . . **8. M. roxburghiana** (Wight) Dubard

b. Leaves elliptic or oblong to oblong-obovate, the base acute or subrotundate, the tip subrotundate or obtuse, sometimes somewhat emarginate; pedicels 1.5—2.5 cm long; appendages $^{1}/_{5}$—$^{2}/_{3}$ as long as the petals 12

12.a. Leaves 5—9 × 3.5—5 cm, tip rounded and often slightly emarginate; petioles 1—2.5 cm; calyx 1 cm, petals 0.65 cm; ovary with glabrous disc. *New Guinea and Tanimbar Islands* . . . . . **9. M. kanosiensis** H. J. Lam & B. Meeuse

b. Leaves 7.5—13 × 3—5 cm, tip obtuse; petioles 2—5.5 cm; flowerbuds oblong and acute; calyx 1.1—1.4 cm; petals 1—1.3 cm; ovary without disc . . . 13

13.a. Secondary nerves ascending at an angle of c. 70°, tertiary nerves mostly one between each pair of secondary ones; pedicels less incrassate towards the bud, which measures c. 1 × 0.3—0.4 cm; petals 1—1.2 cm, the appendages 0.25 cm; staminodes, if any, 0.2 × 0.2 cm; ovary 6-celled. *Fiji*
11. **M. vitiensis** (H. J. Lam & E. van Olden) B. Meeuse

b. Secondary nerves ascending at an angle of about 85°, tertiary nerves about 3 between each pair of secondary ones; pedicels incrassate towards the top, the bud about 1.5 × 1 cm; petals 1.1—1.3 cm, the appendages 0.75 cm; staminodes 0.3—0.6 × 0.2—0.3 cm; ovary 9-celled. *Samoa*
10. **M. samoensis** H. J. Lam & R. A. Maas Geesteranus

Incompletely known:
14. M. kurziana H. J. Lam & B. Meeuse, **15. M. littoralis** (Kurz) Dubard.

Subgenus EUMANILKARA (Dubard) Gilly.

Eumanilkara (Dubard) Gilly, Trop. Woods 73, 1943, 9 — Section *Eumanilkara* Dubard, Ann. Mus. col. Mars. 23, 1915, 8.

1. **M. dissecta** (L.f.) Dubard, Ann. Mus. col. Mars. 23, 1915, 13; Lam c.s. 1941, 325, f. 1; Lam 1942, 42.

Type specimen: *Forster s.n.* in K, dupl. in B, S, from Tonga Islands (var. *dissecta*); *Pancher s.n.* in P, New Caledonia (var. *pancheri*).

Distr.: Samoa, Tonga, New Caledonia, New Hebrides.

Remarks: In the var. *dissecta* (= *typica* Maas Geesteranus) the appendages of the petals are sometimes lanceolate, membranous and shorter than the petals.

2. **M. smithiana** H. J. Lam & R. A. Maas Geesteranus, Lam c.s. 1941, 823, f. 2; Lam 1942, 42.

Type specimen: *A. C. Smith 1450* in BISH, dupl. A, L, US, Fiji — Vanua Mbalavu, Malatta, forest, southern limestone section, 0—100 m alt., tree, 7 m, fl. March, corolla, filaments and staminodes white.

Distr.: Fiji.

3. **M. kauki** (L.) Dubard, Ann. Mus. col. Mars. 23, 1915, 9, f. 1, 2; Lam, Ann. Jard. bot. Bzg, sér. 3, 7, 1925, 239; Lam, l. c., sér. 3, 8, 1927, 481; Lam c.s. 1941, 329 — *Mimusops kauki* L., Sp. Pl., 1753, 349; Stickmann in Linnaeus, Amoenitates Acad. 4, 1759, 122; Brandis, Forest Fl., 1874, 292; Trimen, J. Linn. Soc. 24, 1888, 140; Trimen, Fl. Ceylon 3, 1895, 87 — *Mimusops browniana* Benth., Fl. Austr. 4, 1869, 285.

Type specimen: *Hermann 137* in BM, Ceylon, probably cultivated.

Distr.: Siam, Cochinchina, Burma, Malay Peninsula, Sumatra, Java, Karimundjawa, Madura, Kangean, Bali, Celebes, Butung, Yolo, Sumbawa, Banda, Ambon, Tanimbar Islands, New Guinea, Northern Australia. Thus far unknown from Borneo.

New collections:

Malay Peninsula — Selangor, Batu Tiga Klang: *Milsum C.F. 6546* (SING), fl. Nov.

Java — without loc.: *Labillardière s.n.* (FI).

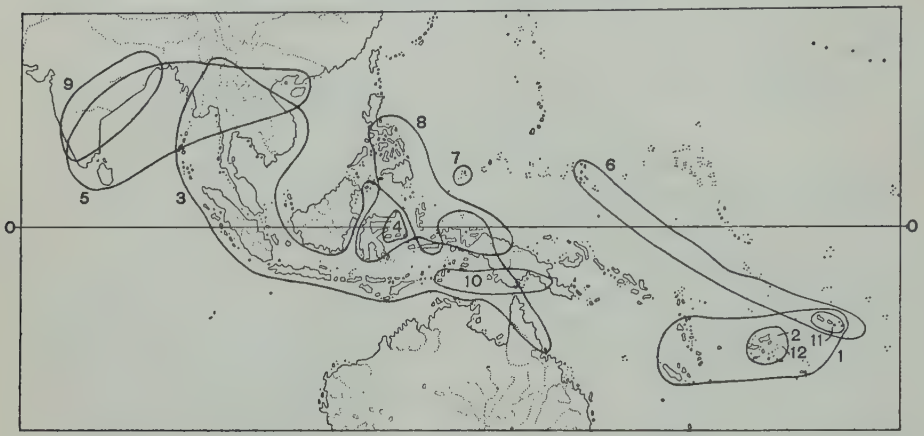
Celebes — Manado, Poso, Tebebugis, alt. 5 m: *NIFS bb. 31903* (BO, L), March.

Ambon — without loc.: *Buwalda s.n.* (BO, L), fr.

Tanimbar Isl. — Olilit, c. 20 m alt.: *NIFS bb. 24436* (BO, L), fr. April.

Remarks: Linnaeus in 1753 (Sp. Pl., p. 349) described two species in *Mimusops,* viz *M. elengi* and *M. kauki,* based on *Hermann 138* and *137* in BM, respectively. The two species are quite distinct but *Mimusops kauki* appeared to be a species of *Manilkara,* as was first recognized by Dubard in 1915.

When trying to trace the identity of Linnaeus' species a remarkable incongruity can be pointed out in Linnaeus' references. *Mimusops elengi* L. is according to the author identical with the specimen pictured by Breyne (Cent. 1, 1677, 20, t. 8). *Mimusops kauki* L., however, which is based on Linnaeus, Fl. Zeyl., 1748, no 137, is according to him identical with the specimen described by Burman (Thes. Zeyl., 1737, 133) and by Hermann (Mus. Zeyl., 1717, 23, 39). Burman, however, bases himself on the same publication and figure by Breyne which according to Linnaeus is identical with *Mimusops elengi* L.. The matter gets still more confused since Linnaeus, Fl. Zeyl., under no 137, refers to Burman, Thes. Zeyl. p. 133. As has been pointed out above Burman based himself on Breyne, so this part of Linnaeus' no 137 refers to *Mimusops elengi* L. but the description which Linnaeus adds refers to *Mimusops kauki* L.. In 1753 Linnaeus distinguishes the two species on one detail only, viz "foliis alternis remotis" for *Mimusops elengi* L. and "foliis confertis" for *Mimusops kauki* L., basing himself on the material of Hermann, resp. the numbers 138 and 137 of the latter's collection from Ceylon. This, however, is not clearly stated by Linnaeus and subsequently Brandis (Forest Fl., 1874, 292) and Trimen (Fl. Ceylon 3, 1895, 87) have clarified this difficulty. We therefore have to accept *Mimusops elengi* L. and *M. kauki* L. as valid species based on material preserved in the British Museum (Natural History), though from Linnaeus' references some doubt about the identity of the species might arise. *Manilkara kauki* is not known from Ceylon in a wild state.



Distribution of the Far-Eastern species of the genus Manilkara — 1. *M. dissecta,* 2. *smithiana,* 3. *kauki,* 4. *celebica,* 5. *hexandra,* 6. *hoshinoi,* 7. *udoido,* 8. *fasciculata,* 9. *roxburghiana,* 10. *kanosiensis,* 11. *samoensis,* 12. *vitiensis.*

The genus *Manilkara* was described by Adanson in 1763 (Fam. 2, p. 166) without a single species. The first specific epithets related to *Manilkara* are those from Dubard in 1915, the oldest specific epithet being *kauki* L.. By some authors *Manilkara balata* (Aublet) Dubard has been regarded as the oldest combination in *Manilkara*, based on *Achras balata* Aublet (Hist. Pl. Guian. Fr. 1, 1775, 309). Aublet bases his species on material from Mauritius (Isle-de-France) in the Jussieu herbarium and points out that it is identical with Rheede's figure of *Manyl-kara* (Hort. Malab. 4, 1673, 53, t. 25). Pierre (Bull. Soc. linn. Paris 64, 1885, 506) considers Aublet's reference to an Asiatic species erroneous and introduces the name *Mimusops balata* (Aublet) Pierre for an American species. Dubard finally recognized this species as belonging to *Manilkara*, using the name *Manilkara balata* (Aublet) Dubard (Ann. Mus. col. Mars. 23, 1915, 19) and adding some synonyms. Chevalier (Rev. bot. appl. & agric. trop. 12, 1932, 267) was the first to recognize this confusion as he was able to consult the first manuscript left by Aublet and the material of *Achras balata*. Contrary to what has been stated by Pierre and Dubard, Chevalier came to the conclusion that *Achras balata* Aublet is not a *Manilkara* but represents *Mimusops commersonii* Engler. The type material (Aublet 308 in Paris) consists of three specimens on one sheet, two of which represent *Manilkara bidentata* (A, DC) Chevalier, the third being *Mimusops commersonii* Engler and this specimen is regarded by Chevalier as the type of *Achras balata* Aublet.

4. **M. celebica** H. J. Lam, Lam c.s. 1941, 331, f. 4.

Type specimen: *NIFS bb. 16979* in BO, dupl. in L, Celebes, Manado, distr. Boalema, near Bilato, c. 50 m alt., fl. May.

Distr.: Celebes and Banggai.

New collections:

Celebes — Manado, Boalema, alt. c. 150 m, old forest, stony, clayey soil: *van Gabel 34 (= NIFS bb. 32528)* (BO, L), common tree c. 27 m, fr. green, Aug.; iibdem: *van Gabel 30 (=NIFS bb. 32365)* (BO, L), fairly common, tree c. 20 m, fr. greenish brown, Aug., nat. name: amibolo; ibidem, Luwuk, Siuna: *NIFS bb. 30152* (BO, L); ibidem, Poso, Uëdele, alt. c. 75 m: *NIFS bb. 31489* (BO, L).

Banggai — Siuwa, alt. 100 m: *NIFS bb. 31840* (BO, L); ibidem, Huhak, alt. c. 60 m: *NIFS bb. 31885* (BO, L), young fl., April.

Remarks: In Lam's description the angle between the secondary nerves and the main rib is stated to be 40°—50°; on studying the type-specimen and the new collections given above, however, this angle rather seems to vary between 50° and 60°. In its sterile parts, i. e. the leaves, this species is therefore relatively easy to distinguish from sterile specimens of *M. kauki*, he latter showing an angle of 60°—70°.

Since fruiting material has been found we are able to complete the description of this species. The description has been based on *van Gabel 34*:

Pedicel of fruit stout, 1.3—2.5 cm, gradually incrassate at top, adpressedly pubescent. Fruit pyriform, globose to subobovate, sometimes slightly 5-angled, 1.6—2 × 1.6—2.4 cm, crowned by a short remnant of the style; pericarp dry, solid; seeds 2 or 3, pyriform, oval to round in cross-section, shining, pale brown, 1.2—1.8 ×0.8—1 × 0.6—0.8 cm, testa relatively thin, crustaceous, scar narrow, c. 0.9 × 0.1 cm, basiventral, sometimes with a surrounding darker coloured region.

5. **M. hexandra** (Roxb.) Dubard, Ann. Mus. Col. Mars. 23, 1915, 9, f. 2; Kerr, Florae siamensis enum. 2, 4, 1938, 263; Lam c.s. 1941, 332, f. 5 — *M. emarginata* H. J. Lam, Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 241; Lam c.s. 1941, 342; Neal, Pac. Science 1, 1947, 243.

Neotype specimen: *Hooker & Thompson s.n.* (L), Malabar, fl.

Distr.: Deccan Peninsula, Bengal, Ceylon, Siam, Indochina, Hainan.

New collections:

BENGAL — without loc.: *Stocks s.n.* (S); near Calcutta: *Helfer s.n.* (S), fl.

INDOCHINA — without loc.: *Poilane 1986* (or *2986 ?*) (P).

HAINAN — Ngai district, on roadside, dry sandy soil, level land: *Lau 501* (B, NY), woody, fl. light yellow, Sept.; ibidem, seaside, in mixed woods: *Wang 34889* (NY, S), fl. Oct.

Remarks: Miss Neal was kind enough to inform us that a cultivated tree, near Honolulu, in the Foster Garden and collected by her (*Neal s.n.* [BISH, L], fr. Sept., fl. Febr., tree, c. 8 m, spreading 15 m, trunk near base c. 50 cm diam., lvs nitidous, dull green above, lighter below, sap juicy) is almost certainly the same from which the type-specimen of *M. emarginata* was taken (*Curran 132*). This tree, which was shown to Dr Lam during a visit to Honolulu in 1949, undoubtedly represents *M. hexandra*.

The leaves in *Hooker & Thompson s.n.* are up to 14.5 cm long, blade up to 12 cm; sepals up to 0.6 cm.

As no type specimen could be traced a neotype has been indicated from material which is found in the same area as Roxburg indicates in his publication (Pl. Corom. 1, 1795, 16, t. 15).

6. **M. udoido** Kanehira, Bot. Mag. Tokyo 47, 1933, 677; Lam c.s. 1941, 333, f. 6; Lam 1942, 42.

Lectotype specimen: *Nisida 2129* (FU), Palau Islands, Aimirük, fl. Nov.

Distr.: Caroline Islands.

Remarks: As the lectotype specimen does not include fruits, *Kanehira 1925* (FU), fr. Aug., is proposed here for the "type-specimen" of the fruits.

7. **M. fasciculata** (Warb.) H. J. Lam & R. A. Maas Geesteranus, Lam c.s. 1941, 335, f. 8; Lam 1942, 42 — *M. merrilliana* H. J. Lam, Lam c.s. 1941, 334, f. 7; Lam 1942, 42.

Type specimen: *Warburg s.n.* (B), New Guinea, Sigar, on coast of McCluer Bay, on dry slopes, fl.

Neotype specimen: *Kostermans 255* (= *NIFS bb. 33925*) in L, dupl. in BO, Morotai, Tobelo, primary forest, young tree, fr. green (to ?) dark red.

Distr.: Luzon, Samar, Mindanao, Celebes, Banggai, Morotai, Obi, Misool, Kai, New Guinea, Meos Num, Waigeo, Japen.

New collections:

SAMAR — Mt Calbiga, forest, alt. 300 m: *Sulit 6412* (A, L), fr. green May, nat. name: petraragan.

CELEBES — Malili, distr. Tabarno, clayey soil, steep country, alt. c. 500 m: *Reppie 4* (= *NIFS bb. 32357*) (BO, L), fairly common, nat. name: kumea; ibidem: *Reppie 40* (= *NIFS bb. 32599*) (BO, L), nat. name: kumia batu; Kolonedale distr., Busanga, alt. c. 100 m: *NIFS bb. 31519* (BO, L); Kasiruta, near Nanoang: *NIFS bb. 23216* (BO, L).

BANGGAI — Sampaka, alt. c. 300 m: *NIFS bb. 31835* (BO, L), young fl., Nov.; Tuntung, alt. c. 170 m: *NIFS bb. 31881* (BO, L), April.

MOROTAI — without loc.: *Tangkilisan s.n.* (BO, L), tree, 40 m, fr. green, nat. name: ligoweer; ibidem: *Tangkilisan 153* (= *NIFS bb. 33841*) (BO, L), tree, 30 m, buttressed, nat. name: liguer; ibidem, alt. c. 40 m: *Kostermans 255* (= *NIFS bb. 33925*) (BO, L), fr. green, July.

OBI — South Obi, Wooi, c. 30 m alt.: *NIFS bb. 23831* (BO, L).

MISOOL — without loc.: *Eykman Inst. s.n.* (BO, L), young fr., Dec.

WAIGEO — Urbinasopon, alt. c. 2 m, on limestone: *Versteegh 11* (= *BW 1*) (L), fl. fr. Nov., tree, c. 35 m, fl. buds green, nat. name: sner.

MEOS NUM — without loc.: *NIFS bb. 30981* (A, BO, L), young fl. Oct.

JAPEN — without loc., alt. c. 200 m: *NIFS bb. 30640* (A, BO, L), fr. Sept.; ibidem: *NIFS bb. 30666* (A, BO, L), fr.; ibidem: *NIFS bb. 30983* (A, BO), mature fr. Oct.; ibidem, alt. c. 250 m: *NIFS bb. 30469* (BO, L), fr. Sept.

NEW GUINEA — Kokas, sea level: *NIFS bb. 22270* (BO, L), Febr.; Hollandia, coastal plain N. of Hollandia, alt. c. 50 m: *NIFS bb. 25079* (BO, L), July; Hollandia, Berap: *NIFS bb. 28966* (BO, L), Aug.; Waren: *Kanehira & Hatusima 14182* (A), fr. April; Tobie Isl.: *Barclay s.n.* (BM); Mimika, Kamarè (Uta), alt. 2 m: *NIFS bb. 32943* (= *Lundquist 224*) (BO), tree, 19 m, nat. name: trotó.

Remarks: As Warburgh's material probably is burnt in the Berlin Herbarium it is proposed here to use *Kostermans 255* as a neotype specimen. As it bears fruits only, *NIFS bb. 31835* is used for a typus florum.

As can be seen from the synonymy *Manilkara merrilliana* and *M. fasciculata* have been united. The differences given in the key on page 325 of Lam's paper (Lam c.s. 1941) are insufficient and in analysing the abundant material before us, we are no longer able to keep the two species apart. The nervation of the leaves, as well as the shape and size of both staminodes and appendages show a series of transitions in which it is impossible to find a gap of any substance. Neither did the distribution present any correlation with certain characters. Yet it must be pointed out that a large-leaved and a small-leaved form may be distinguished, the former having (in bud) 2—3 mm long staminodes, the latter possessing (in bud) 1—1.5 mm long staminodes, being of the same shape in either groups. Since, however in the buds of the large-leaved form staminodes both 1—1.5 mm and 2—3 mm long were found, this character, already a minor one by itself, seems insufficient to justify the distinction of two varieties. This why we decided that *M. fasciculata* and *M. merrilliana* have to be regarded as conspecific.

8. **M. roxburghiana** (Wight) Dubard, Ann. Mus. col. Mars. 23, 1915, 10, f. 3; Lam c.s. 1941, 336.

Type specimen: *Wight 1740* (K), Annamallay, without loc., fl. Dec.

Distr.: India, Western Deccan Peninsula.

Remarks: We were fortunate enough to examine the type specimen and may add the following details to the description of Wight:

Branchlets subsericeous. Leaves 5.5—7.5 × 2—4.5 cm, midrib subcanaliculate above, prominent below, secondary nerves 9—12 on either side, distinct, arching near the margin, tertiary nerves more or less conspicuous, irregularly undulating, but sometimes entirely fading into the reticulate nervation between secondary nerves; petioles subcanaliculate. Pedicel subtomentose at top. Sepals 0.7—1 cm, inner sepals membranous along the margins. Corolla 0.7—1.1 cm, tube 0.3—0.4 cm, segments up to 0.6 cm, appendages as long as or slightly longer than petals, 0.5—0.7 cm. Staminodes 0.3—0.4 cm. Ovary 8-celled.

9. **M. kanosiensis** H. J. Lam & B. Meeuse, Lam c.s. 1941, 337, f. 9.

Type specimen: *Carr 11237* (L), New Guinea, Papua, Kanosia, edge of mangrove swamp, sea level, fl. Febr.

Distr.: New Guinea and Moluccas.

New collections:

TANIMBAR ISL. — Jamdena, between Cape Ilgnei and Otimmer: *NIFS bb. 24311* (BO, L), fl. March; ibidem: *Buwalda 4321* (BO, L), fl. brown-yellow outside, yellowish inside, March.

Remarks: The following may be added to the description of Lam and Meeuse: Tube up to 0.4 cm long, appendages up to 0.65 cm; filaments 0.2—0.3 cm long, anthers 0.4—0.5 cm long.

NIFS bb. 24311 shows the following details: Petioles up to 2 cm long. Secondary nerves up to 18. Segments of petals up to 1 cm long, appendages up to 0.4 cm long, margin sometimes serrate; staminodes up to 0.4 cm long.

The record from the Moluccas is the first one outside New Guinea.

10. **M. samoensis** H. J. Lam & R. A. Maas Geesteranus, Lam c.s. 1941, 338, f. 10; Lam 1942, 42.

Type specimen: *Whitmee 226* (K), Samoa.

Distr.: Samoa.

11. **M. vitiensis** (H. J. Lam & E. van Olden) B. Meeuse, Lam c.s. 1941, 339, f. 11; Lam 1942, 42.

Type specimen: *A. C. Smith 1461* (L), Fiji, on sea cliff.

Distr.: Fiji.

Subgenus EUACHRAS Gilly.

Euachras Gilly, Trop. Woods 73, 1943, 17.

12. **M. hoshinoi** (Kanehira) van Royen, nov. comb. — *Northiopsis hoshinoi* (Kan.) Kan., Lam c.s. 1941, 344; Lam 1942, 43; Glassman, Bern. P. Bish. Mus. Bull. 209, 1952, 88 — *Northia hoshinoi* Kan., Bot. Mag. Tokyo 46, 1932, 489 — *Fig. 1,* i—j.

Type specimen: *Hoshinoi 2138* (FU), Caroline Islands, Ponape, Kolonia, fl. fr. March.

Distr.: Samoa and Caroline Islands.

13. **M. zapota** (L.) van Royen, nov. comb. — *Achras zapota* L., Sp. Pl., 1753, App. 1190; Lam, Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 218; Lam, Bull. Jard. bot. Bzg, sér. 3, 8, 1927, 476; Chun & Benemerito, Sunyatsenia 6, 3/4, 1946, 263, pl. 43 — *Manilkara zapotilla* (Jacq.) Gilly, Trop. Woods 73, 1943, 6; Cronquist, Bull. Torr. Bot. Cl. 72, 6, 1945, 550. — *Fig. 1,* l—q.

Neotype specimen: *Splitgerber 243* (L), Suriname, without loc., common, tree, 6—12 m, fl. yellow, fl. fr. Dec.

Distr.: This species, a native of South America, is being cultivated throughout the tropics.

Remarks: The synonymy of this species is rather complicated, but it has been unraveled partly by Gilly, to whom we may refer here. However, as is pointed out by Lam and van Royen in Taxon 2, 5, 1953, 112 the name *Achras zapota* L. is not a nomen nudum and therefore the name given above is to be regarded as the correct one. Though in the Linnean Herbarium in London a specimen of *Achras zapota* is present no details about habitat, collector etc. are indicated and therefore a neotype have been selected, the more so as Linnaeus himself did not indicate a specimen on which his species has been based.

Incompletely known.

14. **M. kurziana** H. J. Lam & B. Meeuse, Lam c.s. 1941, 342.

Type specimen: *Kurz 624* in ?

Distr.: Burma.

15. **M. littoralis** (Kurz) Dubard, Lam c.s. 1941, 343 — *Mimusops littoralis* Kurz, J. As. Soc. Beng. 45, 1876, 138.

Type specimen: *Helfer 3613* in P ?

Distr.: Tenasserim, Andamans, Nicobars, Cocos Island.

M. kurziana and *M. littoralis* both seem to be very closely related to *Manilkara hexandra* and might as well be conspecific, but as no material could be found this question is left open.

New names and combinations in extra-malaysian species.

16. **Manilkara laciniata** (Lec.) van Royen, nov. comb. — *Faucherea laciniata* Lec., Bull. Mus. hist. nat. 26, 1920, 251, f. 3 — Madagascar.

17. **Manilkara nato-lahy** van Royen, nom. nov. — *Labourdonnaisia hexandra* Lec., Bull. Mus. Hist. nat. 25, 1919, 54 — *Faucherea hexandra* (Lec.) Lec., l. c. 1920, 248 — Madagascar.

As the specific epithet *hexandra* has been used already by Roxburgh (1795) for a species of *Mimusops* which was transferred by Dubard in 1915 to *Manilkara* it became necessary to adopt a new specific epithet.

18. **Manilkara cordifolia** van Royen, nom. nov. — *Faucherea parvifolia* Lec., l. c. 1920, 251, f. 4 — Madagascar.

The specific epithet *parvifolia* could not be used here as Radlkofer in 1908 described a *Mimusops parvifolia* which was subsequently transferred by Dubard (1915) to *Manilkara*.

19. **Manilkara thouvenotii** (Lec.) van Royen, nov. comb. — *Faucherea thouvenotii* Lec., l. c. 1920, 248 — Madagascar.

Index of collectors' numbers.

The numbers between brackets indicate the number of the species.

Barclay s.n. (7) — Buwalda s.n. (3); 4321 (9) — BW 1 (7) — Carr 11237 (9) — Curran 132 (5) — Eykman Inst. s.n. (7) — Forster s.n. (1) — van Gabel 30 (4); 34 (4) — Helfer s.n. (5); 3613 (15) — Hermann 137 (3) — Hooker & Thompson s.n. (5) — Hoshinoi 2138 (12) — Kanehira 1925 (6) — Kanehira & Hatusima 14182 (7) — Kostermans 255 (7) — Kurz 624 (14) — Labillardière s.n. (3) — Lau 501 (5) — Lundquist 224 (7) — Milsum CF 6546 (3) — Neal s.n. (5) — NIFS bb. 16979 (4): 22270 (7); 23216 (7); 23831 (7); 24311 (9); 24436 (3); 25079 (7): 28966 (7): 30152 (4); 30469 (7); 30640 (7); 30666 (7); 30981 (7); 30983 (7); 31489 (4): 31519 (7); 31835 (7); 31840 (4); 31881 (7); 31885 (4); 31903 (3); 32357 (7); 32365 (4); 32528 (4); 32599 (7); 32943 (7); 33841 (7); 33925 (7) — Nisida 2129 (6) — Pancher s.n. (1) — Poilane 1986 (2986 ?) (5) — Reppie 4 (7); 40 (7) —

A. C. Smith 1450 (2); 1461 (11) — Splitgerber 243 (12) — Stocks s.n. (5) Sulit 6412 (7) — Tangkilisan s.n. (7); 153 (7) — Versteegh 11 (7) — Wang 34889 (5) — Warburg s.n. (7) — Whitmee 226 (10) — Wight 1740 (8).

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The numbers behind the names indicate the number of the species. New names and combinations are denoted by an asterisk, synonyms in *italics*.

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  parvifolia Lec. 18
  thouvenotii Lec. 19
Labourdonnaisia hexandra (Lec.) ... 17
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  *cordifolia van Royen 18
  dissecta (L. f.) Dubard 1
  emarginata H. J. Lam 5
  fasciculata (Warb.) H. J. Lam & R. A. Maas Geesteranus 7
  hexandra (Roxb.) Dubard 5
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  smithiana H. J. Lam & R. A. Maas Geesteranus ... 2
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  udoido Kanehira 6
  vitiensis (H. J. Lam & E. van Olden) B. Meeuse 11
  *zapota (L.) van Royen 13
  zapotilla (Jacq.) Gilly 13
Mimusops browniana Bentham 3
  kauki L. 3
Northia hoshinoi Kanehira 12
Northiopsis hoshinoi (Kan.) Kanehira 12

REVISION OF THE BURSERACEAE OF THE MALAYSIAN AREA IN A WIDER SENSE

V [1]). Haplolobus

by

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(Issued 18. XII. 1953)

I. GENERAL PART.

1. Introduction.

More than twenty years have elapsed since the senior author (H. J. Lam) recognized *Haplolobus* as a genus separate from *Canarium*. In the mean time much newly collected material has become available and in view of the intended revision for Flora Malesiana, the time has come to sum up our present knowledge.

It must be said first of all that this knowledge, in spite of a considerable progress, is still far from satisfactory. Not only is much of the material sterile, but the genus however small it is, more and more proves to be an extremely difficult one to handle in a practicable way. Whether or not this is due to its phylogenetic youth is of little consequence. The fact stands that we have to deal with a genus in which the subgeneric limits, even if intuitively recognizable to the experienced eye, are so evasive as to make it extremely difficult to show them clearly to the man of practice who has to work with the species and the names attributed to them.

The present review it therefore particularly unsatisfactory from a practical point of view. We have tried to find the most sensible course between the Scylla of too much lumping and the Charybdis of too much splitting. This is, of course, not equally applicable to all species. There are some which are — or now seem — to be well delimited. Others, however, such as the group comprising *H. microphyllus, glandulosus, monticola, ledermannii, monophyllus,* and *nubigenus,* and the group formed by *H. moluccanus, celebicus, floribundus,* and *anisander,* are particularly nasty in this respect.

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[1]) I—IV in Blumea VII, 1, 1952, 154—170.

2. Pen portrait of the genus.

To the expert who has grown familiar with the genus, there is little doubt as to the generic identity, even of sterile specimens. The absence of resiniferous vascular ducts in the medulla of the branchlets, together with the presence of such ducts in the medulla of the petioles — which can easily been seen and counted on making a cross section with a sharp pen knife and examining the cut with an ordinary 10 x pocket lense —, as well as the absence of stipules, makes the generic identification of specimens from or near the generic area fairly certain.

In addition, certain characters of leaf shape and venation, which are difficult to describe, may be of some help. One of them is that the leaves are rarely more than 4½-jugate.

In fertile material there is some help from the inflorescences, c. q. infrutescences. These are mostly axillary, often but not exclusively to the uppermost leaves; in a few cases terminal or subterminal inflorescences are known. The latter sometimes show an obsolete and overtopped vegetative bud and may be either terminal on branches of "herbarium size" or on smaller axillary ones. In a few cases these axillary shoots bear a small leaf.

The most striking character of the inflorescences, however, and particularly of the axillary ones, is that they are only rarely more or less long pedunculate. In most cases they are branched from near their base.

On the other hand, while the flowers hardly show any usable specific difference, the fruit yield the only perfectly trustworthy generic character by which *Haplolobus* can be distinguished from the related genera *Canarium, Dacryodes* and *Santiria*: the pericarp is dry and thin, the pyrenes are papyraceous and connate, and there is never more than one seed, which occupies the whole fruit, pressing the empty pyrenes aside, the cotyledons being entire, thick and planoconvex.

It is remarkable fact of historical importance that these generic characters, particularly those of the fruit, were recognized as such by the famous botanist and collector Odoardo Beccari as early as 1872 (cf quotations under *H. acuminatus* and *leeifolius*) on material from New Guinea. Although Beccari collected fruiting material even earlier (1866) in Borneo, he failed to recognize it (*H. beccarii*, see there) as apart from *Canarium* or *Santiria.*

The following morphological (anatomical) particulars are noteworthy:

a. Leaves. Mostly glabrous. Pubescence is only found in *H. acuminatus* and in a lesser degree *H. beccarii* and *robustus.*

The leaves are mostly (1½—)2½—4½-jugate (5—9 leaflets). Leaves with 11 leaflets have been found in *H. moluccanus,* with 13 in *H. beccarii.* On the other hand leaves with 2 or 1 leaflets are not rare. Unifoliolate leaves are found exceptionally in *H. anisander, clementium, maluensis,* and *nubigenus.* In *H. monophyllus* they are in the majority and next to some trifoliolate leaves bifoliolate ones are found.

The tertiary venation of the leaflets is always transverse.

b. Nectaries and "domatia". In some species two phenomena were found which, while apparently related mutually, are unknown to us in any other genus of the *Burseraceae*: foliar nectaries and hairtufts (domatia) in the nerve axils.

The foliar nectaries are most pronounced in *H. glandulosus* and *microphyllus*, where they seem to be restricted to the nerve axils, hollow on the lower leaf surface, convex and bullate on the upper one. In the closely related *H. monticola* they are not always present but in addition to those in the axils of the secondary nerves there are occasionally accessory and shallower ones on the blade between the nerves.

In some cases these "glandular pits" are rare or extremely tiny (*H. nubigenus*), in others they are provided with a more or less hairy rim (*H. monticola*), thus forming a transition to the "domatia" which are situated in the nerve axils and are most conspicuous and frequent in *H. monophyllus*, much smaller and rare to very rare in *H. aneityensis* and *anisander*.

c. Resiniferous ducts in petioles. The number of resiniferous ducts (r. d.) in the medulla of the petioles is, to a certain extent, useful as a group character. In almost half the number of species (10 out of 21) it does not surpass 5 and in some species (*H. monophyllus* and *nubigenus*) it is restricted to 1, as far as our experience goes.

In many other species, however, this number may be subject to a considerable variability. This may correlate with a general variability of the species in question (e. g. *H. aneityensis*: 1—9; *acuminatus*: 2—17; *celebicus*: 1—9; *floribundus*: 1—11) or whether or not in addition it may be due to the tendency of these ducts particularly those on the lower (convex) side of the petiole, to coalesce and join into a few or even one single crescent-shaped duct (of annotation under *H. acuminatus*). This may be the case in such species as *H. megacarpus* (5—12), *hussonii* (3—11), *versteeghii* (3—7), and *maluensis* (about 9).

The largest numbers of petiolar resiniferous ducts are found in *H. robustus* (about 15), *beccarii* (15—20), and above all *H. moluccanus* (10—40!), in which either or both of the two phenomena just described (variability and coalescence) may occur.

It would be worth while to study in detail the anatomy of these ducts. There seem to be both collateral and amphivasal ones and there may well be some correlation with other characters. Unfortunately we had no opportunity to carry out an investigation of this kind which can probably be made even on herbarium material.

d. Inflorescences. The ♂ inflorescences are usually larger, more widely branched and more-flowered than the ♀ ones. Their generic variability is considerable, but in the majority of species they are axillary and often branched from near the base. Only in one species (*H. floribundus*) have terminal or subterminal inflorescences (as are not rare in *Dacryodes*) been found. This character, which is still insufficiently known owing to lack of material, seems to be rare, if present at all, in its strictest sense. It seems to be often accompanied by the presence of apparently obsolete vegetative buds. Should these develop, the once terminal inflorescence is automatically broken up into a combination of lateral ones and it is therefore not surprising that in a few cases such inflorescences (themselves axillary to a leaf) are provided with a small leaf instead of a bract.

Inflorescential vegetative buds have been found in *H. glandulosus, floribundus, leeifolius,* and *monophyllus.*

e. Flowers and fruits. These are quite uniform and provide little or no characters of specific value (cf diagnosis on p. 419). The fruits are usually ellipsoid or ovoid, rarely (sub)globular (*H. leeifolius*) or pointed at apex (*H. aneityensis*) but other species show these characters as well, though in a lesser degree. The fruits are mostly small, 0.7—2.2 cm long and 0.5—1.3 cm in diam. Only in *H. megacarpus* are they "as large as an olive", viz 2.3—2.8 × 1.3—1.8 cm. For a detailed description with figures of a *Haplolobus* fruit, see under *H. leeifolius* (cf Lam, 1932a, fig. 102 C 1, sub b [diagr. of fr.] and fig. 105 [fr. and its structure]).

However, flowers and fruits are still unknown in many species. In fact, in only 3 out of the 21 species here accepted are ♂ flowers, ♀ flowers and fruits known, viz of *H. acuminatus, floribundus* and *maluensis.* For the other species the situation is as follows.

+ known; — unknown; (—) adult or mature only unknown.

	flowers		fruits
	♂	♀	
H. microphyllus	—	+	—
— glandulosus	(—)	(—)	+
— monticola	—	+	—
— ledermannii	+	—	+
— robustus	—	—	+
— beccarii	—	—	+
— moluccanus	+	—	+
— celebicus	+	—	+
— versteeghii	—	—	(—)
— hussonii	—	—	+
— megacarpus	—	—	+
— monophyllus	+	—	—
— nubigenus	+	+	—
— clementium	—	+	+
— aneityensis	+	—	+
— borneensis	+	—	—
— anisander	+	+	—
— leeifolius	+	—	+

Despite the fact that the sexual dimorphism is much less pronounced in the flowers (and inflorescences) of *Haplolobus* than in those of most *Canarium* species, no evidence is available that occasional ♀ flowers (and fruits) are developing on ♄ trees, as is sometimes the case in certain *Canariums.*

3. Distribution, relationships, and ecology (*Fig. 1*).

Of the 21 species, comprised in the present revision 15 occur in New Guinea, of which 14 are endemic in that island. Endemic in Borneo are 2 species (*H. beccarii* and *H. borneensis*), 2 are restricted to the Moluccas (*H. moluccanus*; *H. monophyllus*, Morotai only) and 1 to the Western Pacific islands (*H. aneityensis*). One species (*H. celebicus*) is probably common to Celebes and the Moluccas and there is only 1 "wide" (*H. anisander*) which apparently occurs from Banggai (just east of Celebes) to New Britain. Close relationships between several of these, however, may make geographical limits uncertain (cf Remarks under *H. moluccanus, celebicus, floribundus* and *anisander*).

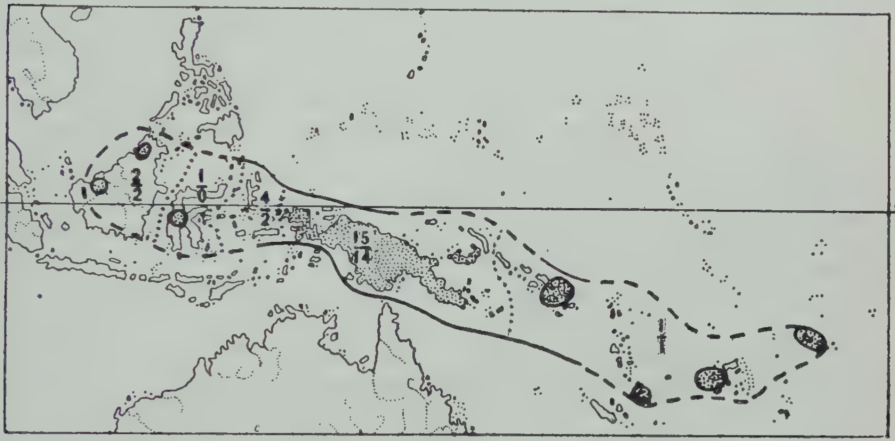


Fig. 1. — Area of *Haplolobus*. Numbers above the line indicate the number of species in the area in question, those below the line show the number of endemics in that area.

Of the two Borneo species one (*H. borneensis*) is a mountain tree, apparently of Papuan alliance. Strange as it is, the other one (*H. beccarii*), though indubitably a *Haplolobus* on account of the fruits, shows relations (in its vegetative parts) with certain *Canarium* species rather than with any other *Haplolobus* (cf Lam 1938b).

Of the species from Celebes and the Moluccas *H. celebicus* and *H. moluccanus* are very closely allied with Papuan species, notably *H. anisander*. *H. monophyllus*, a mountain species thusfar only known from Morotai, is closely linked with such Papuan mountain trees as *H. nubigenus, monticola, microphyllus, glandulosus* and *ledermannii*.

The Pacific species (*H. aneityensis*) is undoubtedly related to various Papuan species but it is hard to say with which.

Of the 21 species some 9 are only known from mountainous regions, but this may, at least partly, be due to insufficient collecting. The highest elevation is 1800 m (*H. microphyllus*). Other mountain trees are *H. glandulosus* (1000—1750 m), *H. ledermannii* (850—1000 m), *H. robustus*

(850 m), *H. versteeghii* (1150 m), *H. monticola* (1000 m), *H. clementium* (750—1000 m), all from New Guinea, and *H. monophyllus* (1000 m, Morotai), and *H. borneensis* (1500 m, Mt Kinabalu, North Borneo). *H. nubigenus* (New Guinea) is reported from (200—)850—1500 m. Most of these species have rigid, coriaceous leaflets with a dense and prominent reticulation, and in addition, some of them have extremely small and delicate ones, notably *H. microphyllus* and *H. ledermannii.*

Most other species seem to be lowland trees. Only a few are also reported from the hills, e. g. *H. acuminatus* and *floribundus,* of which some specimens are known from localities between 600 and 900 m.

4. Nomenclature, synonymy, types, material.

In 1932, the senior author enumerated 12 species. In 1938 he described another one (*H. celebicus*) and in 1950 C. T. White described *H. salomonensis.* Thus, when we started this revision 14 species were known, of which 1 from Borneo, 1 from Celebes, 1 from the Moluccas, 10 from New Guinea, and 1 from Western Polynesia.

Of these 14 species 4 are here considered synonyms to others, viz
H. pachypodus (Laut.) H. J. Lam = H. acuminatus (K. Schum.) H. J. Lam
H. furfuraceus (Laut.) H. J. Lam = H. floribundus (K. Schum.) H. J. Lam
H. sepikensis (Laut.) H. J. Lam = „ „ „ „
H. salomonensis C. T. White = H. aneityensis (Guill.) A. M. Husson.

Of all species but one type material could be studied. However, the Berlin bombardment and subsequent fire destroyed the greater part of the rich collections of the Botanical Museum, including the types of Ledermann and Hollrung. In only one case (*H. maluensis*) no duplicate or paratype has been preserved and in that case a full plate, made from that material by the senior author when preparing his 1932 paper has been published in the present paper and has been proposed to serve as a type. For the rest, of 5 species duplicates had to be designated as lectotypes, viz 3 for Ledermann specimens (*H. ledermannii, anisander,* and *leeifolius*) and 2 for specimens collected by Hollrung (*H. acuminatus* and *floribundus*); for 1 species (*H. nubigenus*) a neotype had to be proposed.

In addition, 1 new combination has been made (*H. aneityensis*) and 10 new species have been described here, 5 of which by A. M. Husson and 5 by H. J. Lam. Not less than of 3 of these are based on material collected by Beccari in 1866 and 1875! (*H. beccarii, hussonii,* and *megacarpus*).

For the present study material was available from the following herbaria:

A	Arnold Arboretum Herbarium, Harvard University, Jamaica Plain, Mass.;
B	Botanischer Garten und Museum, Berlin;
BISH	Herbarium of Bernice P. Bishop Museum, Honolulu;
BM	Department of Botany, British Museum (Natural History), London;
BO	Herbarium Bogoriense, Bogor, Java;
BRI	Queensland Herbarium, Botanic Gardens, Brisbane;
FI	Erbario del Instituto Botanico dell'Università, Firenze;
K	Herbarium, Royal Botanic Gardens, Kew, Surrey;
LAE	New Guinea Forestry Service, Lae;
L	Rijksherbarium, Leiden;
MEL	Botanic Gardens and National Herbarium, Melbourne;
P	Laboratoire de Phanérogamie du Muséum National d'Histoire Naturelle, Paris.

Unfortunately no material could be obtained from Wroclaw (Breslau), where the Lauterbach types ore — or were — preserved.

In addition, some of the material quoted in previous papers by the senior author failed to turn up. The *Warburg specimens* (cf Lam 1932b, p. 419) from Mt. Sibela, Batjan (Moluccas) are unfortunately lost with the Berlin collections. We were also unable to unearth the sterile New Guinea specimens *Docters van Leeuwen 10655, 10765,* and *11186,* cited on the same page, which were thought to perhaps represent *H. leeifolius.* For other material of this kind, see under the species in question.

The figures are from the able hand of Mr. H. J. T. Tammel, staff artist of the Rijksherbarium, with the exception of fig. 8 which has been made by the Javanese draughtsman Darmosudiro.

II. TAXONOMICAL PART.

HAPLOLOBUS.

Haplolobus H. J. Lam, 1931, p. 25, footnote; id. 1932a, 207 and 1932b, 404. — Dioecious forest trees, often slender and of moderate height, not heavily buttressed. Medulla of branchlets without resiniferous ducts. *Leaves* 1½—4½-jugate, more rarely unifoliolate, or up to 6½-jugate, exstipulate, medulla of petioles with 1 to many resiniferous vascular bundles. *Inflorescences* mostly axillary, rarely also terminal on larger branchlets, or on smaller axillary shoots which may bear one or a few leaves, or show an obsolete vegetative bud, which is getting overtopped, ♂ ones generally larger than ♀ ones and more-florous, sometimes pedunculate but mostly branched from near the base. *Flowers* small and of little variety, unisexual though always provided with the organs of the other sex. *Calyx* with 3 more or less distinct teeth or subtruncate, permanent and spreading in fruit. *Petals* 3, valvate or slightly imbricate in the middle part, the apex mostly somewhat thickened and inflexed. *Stamens* 6, mono- or slightly didynamous and in that case the shorter (younger) ones epipetalous and slightly higher inserted; filaments inserted on the outside of the disk or free outside it; anthers basi- or dorsifix, little reduced in size in ♀ flowers but probably always sterile. *Disk* more or less 6-lobed or undulate or truncate, flattened and spreading under the fruit. *Ovary* glabrous, 3-celled, with thin septa and a sessile or subsessile 3-lobed or truncate stigma, in ♂ flowers mostly little reduced in size but probably always sterile, even though small ovules may be present; cells with two collateral axile epitropous ovules with ventral raphe and superior micropyle. *Fruits* rarely larger than 2.5 cm long, mostly ovoid or ellipsoid, more rarely globular or pointed at apex, always 1-seeded; pericarp thin and dry, putamen with entirely connate pyrenes, apparently without axial intrusion (as occurs in *Canarium*), 3-celled, extremely thin, papyraceous, pressed against the walls by the solitary seed which is shaped as the fruit; seeds with a very thin testa, the hilum usually little above the middle; albumen wanting or very scanty, cotyledons planoconvex, thick, entire, the separating plane radial. Some 21 species in *Borneo, Moluccas, New Guinea* and *Western Polynesia.*

Type species: *H. moluccanus* H. J. Lam.

Key to the species.

1a. Leaflets with glandular pits in the axils of the secondary nerves below, sometimes also on the blade between the nerves (Note. Sometimes these pits are very minute or wanting in some of the leaflets; in other cases there are hairy tufts (domatia) in their stead. For doubtful cases and in cases in which only "domatia" are found, nr. 14 of this key should also be consulted) . . . 2

b. No glandular pits extant 3

2a. Leaves 1½—2½-jugate, leaflets narrowly oblong, 3.7—7 × 1.4—2.4 cm, including a narrow acumen of 0.9—1.2 cm; secondary nerves 4—5; reticulation very minute. *New Guinea* . . . . **1. H. microphyllus**

b. Leaves 1½—2½-jugate, leaflets ovate to ellipsoid, shortly and broadly acuminate, 5—10.5 × 3—5.5 cm; secondary nerves 6—9; reticulation not very minute. *New Guinea* . . . . **2. H. glandulosus**

c. Leaves 2½—3½-jugate, leaflets oblong to oblong-lanceolate, shortly and broadly acuminate, 10—16.5 × 4.5—5.5 cm; reticulation fairly wide. *New Guinea* **3. H. monticola**

3a. Leaflets very small, narrowly oblong, rigid, distinctly acuminate, 1.6—6 × 0.4—2.5 cm, acumen 0.5—1.5 cm. *New Guinea* . . . . . . **4. H. ledermannii**

b. Leaflets larger, if distinctly acuminate acumen much shorter than $^{1}/_{3}$—$^{1}/_{4}$ of blade 4

4a. Young parts woolly pubescent; leaflets more or less sparsely pubescent underneath, particularly along nerves 5

b. Young parts glabrous or at least not woolly pubescent; leaves entirely glabrous or, if pubescent, then leaflets 21—36 × 7.5—10 cm and petioles with 14—19 resiniferous ducts in medulla 6

5a. Inflorescences: ♂ 17—12, ♀ (also in fruit) 1—4 cm long; leaflets not rigid, not very abruptly acuminate. *New Guinea* . . . . . . **5. H. acuminatus**

b. Inflorescences: ♂ unknown, ♀ (infrutescenses) 10—13 cm long, broadly paniculate, lowest ramifications 3.5—8.5 cm long; leaflets rigid, with a small and narrow, abrupt acumen of 0.5—1 cm and very strongly prominent nerves underneath. *New Guinea* . . . . **6. H. robustus**

6a. Leaves large for the genus, resiniferous ducts in the petioles numerous, 14—25 (—40), leaflets (12—)20—40 cm long, 8—18 cm broad 7

b. Leaflets usually smaller, resiniferous ducts never more than 10 to 12, mostly less 8

7a. Leaflets oblong-lanceolate, 21—36 × 7.5—10 cm, base more or less acute, secondary nerves 25—30, with tertiary ones prominent underneath; leaves (always?) 6½-jugate, petiole at base 1.3 cm thick. *Borneo* . . . . . . **7. H. beccarii**

b. Leaflets broadly oblong with rounded to subcordate base, (12½—)24—38 × (6½—)10—17½ cm, secondary nerves (9—)12—18, tertiary ones hardly prominent beneath; leaves (3½—)4½(—5½)-jugate, petiole at base 0.8 cm thick. *Moluccas* . . . . **8. H. moluccanus**

8a. Resiniferous ducts in medulla of petioles (1—)3—12; leaflets, at least in fertile branchlets fairly large, 10—22 cm long 9

b. Resiniferous ducts in medulla of petioles 1—3(—5); leaflets, at least in fertile branchlets, smaller, 3—12(—18) cm long 13

9a. Inflorescences of both sexes axillary or (sub)terminal, male ones (as far as known) (5—)10—28 cm, female ones or infrutescences (without the fruits) 2.5—13 cm long 10

b. Female inflorescences and infrutescences (without the fruits) 2.5—5.5 cm long, always axillary 11

10a. Male inflorescences widely branched, slender and gracile, many-florous, 10—22 cm long, female ones more stiff, little branched, few-flowered, about 10 cm long; leaves relatively large, mostly 2½—3½(—4½)-jugate, petioles 7—11 cm long, medulla with (1—)4—8(—9) resiniferous ducts; leaflets often greenish when dry with dark-brown midrib and broadly rounded base, ovate to oblong, 9—21 × 4—10 cm, rather thin, reticulation above not dense and minute; fruits small, 1.2—1.6 × 0.7—1.1 cm, dull. *Celebes, Moluccas?* . . . . . . **9. H. celebicus**

b. Male inflorescences not many-florous, not widely branched, rather stiff, 5—15 cm

long, female ones 2.5—10 cm; leaves ½—2½(—3½)-jugate, petioles 3—9 cm long, medulla with 10—12 resiniferous ducts; leaflets broad-ovate to obovate with broad base, 5—18(—21) × 5—9 cm, rather thin, reticulation above not dense and minute; fruits larger, dull, up to 2.2 × 1.4 cm. *New Guinea*
10. H. maluensis

c. Inflorescences stiff, often (sub)terminal, male ones 6—17, female ones (or infrutescences without the fruits) 2.5—14 cm long; leaves (1½—)2½—4½-jugate, petioles 4—9 cm, medulla with 1—3—8(—11) resiniferous ducts; leaflets often with a fairly minute and dense reticulation above, rigid, oblong to ovate-elliptic, 7.5—18(—20) × 4—9 cm; fruits ovoid or subglobular, shining, 1.5—1.9 × 0.9—1.5 cm. *New Guinea* . . . . **11. H. floribundus**
See also the incompletely known mountain species. *New Guinea*
12. H. versteeghii

11a. Venation strongly prominent on lower side; infrutescences thick and strong (one known) 7 cm long; branchlets 0.8—0.9 cm thick, heavily pustulate. *New Guinea*
12. H. versteeghii

b. Venation little or at least not strongly prominent; infrutescences slender, 2.5—5 cm long; branchlets 0.4—0.5 cm thick, not or not heavily verrucose . . . 12

12a. Leaflets oblong, (8—)14—22(—27) × (3.4—)7—9(—9½) cm, secondary nerves 9—17; fruits 1.2—1.6 × 1—1.2 cm. *New Guinea* . . . . . **13. H. hussonii**

b. Leaflets ovate, (8.5—)10—13(—16.5) × 5—7 cm, secondary nerves 7—8; fruits 2.3—2.6 × 1.3—1.8 cm. *New Guinea* . . . . **14. H. megacarpus**

13a. Leaves ½—2½-jugate, leaflets more or less rigid, acute or gradually acuminate; inflorescences (♂ ones unknown in *H. clementium*) 1—5, infrutescences up to 6 cm long 14

b. Leaves 1½—4½-jugate, leaflets thin or if rigid leaflets small (up to 14 × 6 cm) and ♂ inflorescences long (up to 18 cm) and widely branched 15

14a. Leaves ½(—1½)-jugate, leaflets rigid, 6—12.5 × 2.5—5.7 cm, often (always?) with distinct hairy tufts (domatia) in the nerve axils below, reticulation very minute, petiolules long and slender; secondary nerves 6—9; only 1 resiniferous duct in medulla of petioles; ♂ inflorescences very slender, few florous. *Morotai*
15. H. monophyllus

b. Leaves ½—2½-jugate, leaflets very stiff, no domatia but in their stead sometimes tiny glandular pits, 3.5—8.3 × 1.3—5 cm; reticulation minute, petiolules short and stout; secondary nerves 6—9; only 1 resiniferous duct in medulla of petioles; even the few-florous ♂ inflorescences fairly rigid. *New Guinea*
16. H. nubigenus

c. Leaves (½—)1½—2½-jugate, leaflets fairly rigid, oblong, without domatia or pits in the nerve axils, 8.5—17 × 3.5—6.5 cm, reticulation rather lax; secondary nerves 11—14; resiniferous ducts in medulla of petioles 2—5; ♀ inflorescences crowded, many-florous; infrutescences up to 8 cm long; fruits ovoid, 1.2—1.5 × 0.7—0.8 cm. *New Guinea* . . . . **17. H. clementium**

15a. Leaflets rounded to subcordate at base; ♂ inflorescences many-florous, 5—17 cm long, widely branched 16

b. Leaflets broadly to mostly rather narrowly acute at base; ♂ inflorescences long or short 17

16a. Leaves 2½—4½-jugate, leaflets poplar-shaped, short with a broad base and a gradually contracted apex, (7—)10—15(—20) × (4.3—)6—8(—9) cm; resiniferous ducts in medulla of petioles 1—4(—9); ♂ inflorescences 5—16 cm long, widely branched; infrutescences 2—3 cm long; fruits ovate, acutely pointed, 1.5—2.1 × 0.7—1.1. cm. *Western Polynesia* . . . . **18. H. aneityensis**

b. Leaves 1½—3½-jugate, leaflets oblong with broad base and abruptly contracted apex, 7—14(—20) × 4—6(—9) cm; ♂ inflorescences crowded, lax, 6—17 (—21) cm long, infrutescences 4—14 cm, fruits ovoid or subglobular, not pointed. *New Guinea* . . . . **11. H. floribundus**

17a. Leaflets rather rigid and relatively narrow, 3.5—13 × 1.3—5.3 cm; ♂ inflorescences widely branched, many-florous, 6—18 cm long. *Borneo* **19. H. borneensis**

b. Leaflets rather thin, or if more or less rigid, larger 18

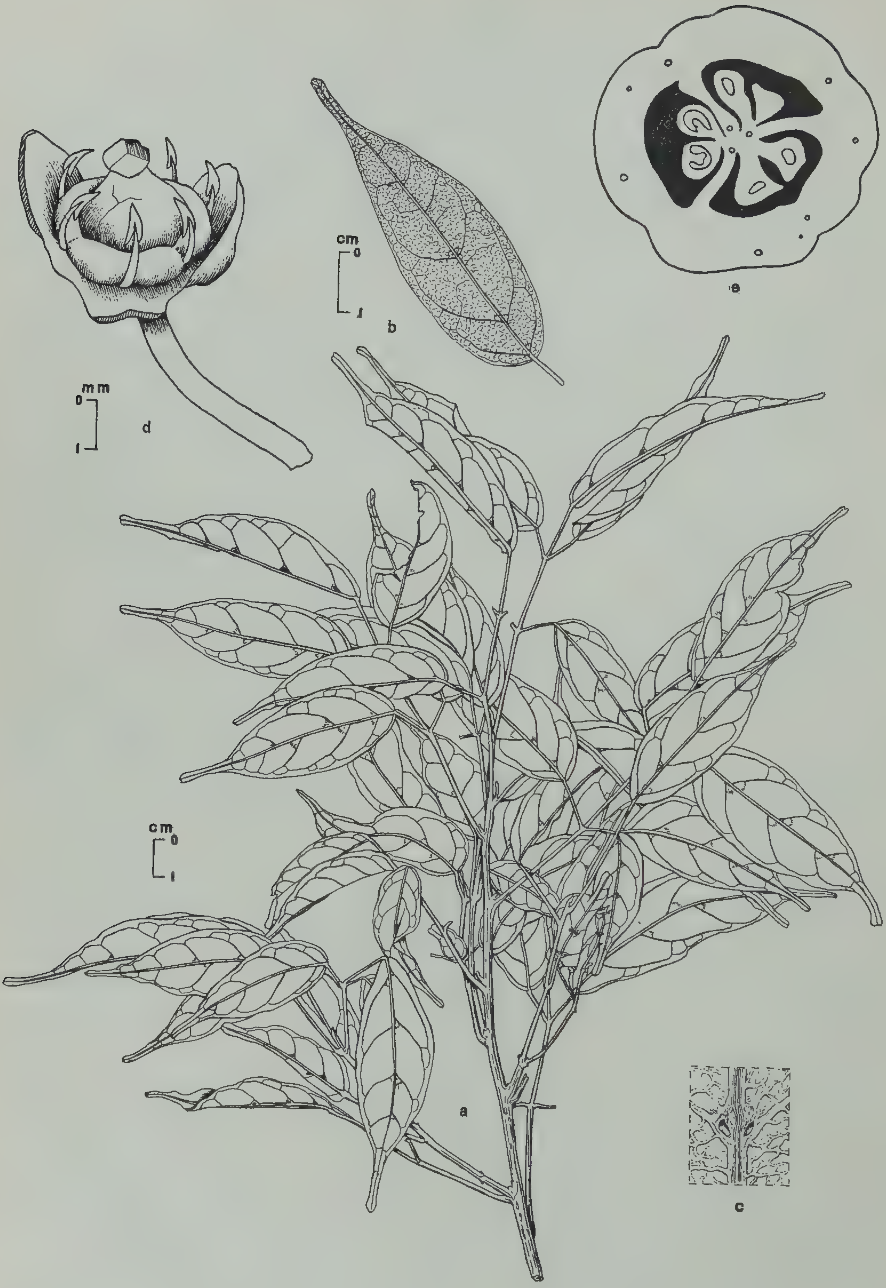


Fig. 2. — *H. microphyllus* A. M. Husson — a. branchlet with leaves; b. leaflet with venation and glandular pits; c. detail of glandular pits; d. ♀ flower without corolla; e. cross section of ovary — from type specimen (*Brass & Versteegh 11198*, L).

18a. Leaflets rather rigid, often broad at base. *New Guinea* . . 11. **H. floribundus**
b. Leaflets thin, often greenish when dried, with long and slender petiolules and slender nerves, 8—15(—21) × (2.5—)4—6(—8.5) cm; ♂ inflorescences few-florous, very slender, not widely branched, 1.5—8 cm long. *Moluccas, New Guinea, New Britain* . . . . 20. **H. anisander**
c. Leaflets thin but stiff, relatively broad, 7—15.5 × 3.5—7 cm; ♂ inflorescences rather many-florous, widely branched, 4—8 cm long; infrutescences up to 4 cm long; fruits globose, 1.1—1.3 cm in diam.. *New Guinea* . . . 21. **H. leeifolius**

Note. In the literature quoted under the species, the papers by Lam and by Lauterbach have been cited in an abbreviated form, in accordance with the bibliography given at the end of the paper.

Abbreviations in the quotation of specimens are:

NGF	New Guinea Forestry Service (Lae)
NIFS	Neth. Indies Forestry Service (Bogor = Buitenzorg)
FRI	Forest Research Institute (Bogor).

The latter two are practically identical; both use so-called bb.-numbers.

1. **H. microphyllus** A. M. Husson, nov. spec. — *Fig. 2.* — Arbor altiuscula. *Ramuli* graciles, ca 1½—3—(5) mm diam., lenticellati, alabastro terminali glabro aut minute pulverulento, medulla compacta aresinosa. *Folia* glabra, 1½—2½-jugata; petioli teretes lenticellati supra conspicue deplanati (subcanaliculati), 2.5—3.5 cm longi, rachidis partes interjugales 1.5—2.4 cm longae, petiolorum medulla 1(—3) fasciculis resiniferis percursa; foliola chartacea, lanceolata vel oblongo-lanceolata, basi plus minusve inaequalia rotundata ad acuta, apice longe abrupte obtuse acuminata, minute emarginata, 3.7—7 × 1.4—2.4 cm, acumine 0.9—1.2 cm longo, 0.15—0.3 cm lato; petioluli laterales 0.9—1.3 cm, terminales 1.7—2.5 cm longi; costa media supra paulo sulcata subtus conspicue prominens, nervi secundarii utrimque in sicco paulo prominentes, 4—5, angulo 40°—50° de costa adscendentes et a principio curvati, diminuentes, arcuatim conjuncti, in eorum axillis glandulis ovatis supra paulo bullatis praediti; glandulae ca 0.2 mm diam., glabrae, subtriangulares, nervi tertiarii utrimque prominentes, minute reticulati. *Inflorescentiae* ♂ ignotae, ♀ laterales, pauciflorae, glabrae, racemosae, 5 cm longae, ebracteatae (?). *Flores* ♂ ignoti, ♀ glabri, pedicelli 0.5—0.7 cm longi, ebracteolati (?). *Calyx* 3-fidus, ca 2.5 mm altus, sepalis brevibus late deltoideis. *Petala* ignota. *Stamina* sterilia 6 paulo didynamia glabra, antheris deltoideis, filamentis vittiformibus, apice angustatis, extus discum crassum 6-undulatum insertis. *Ovarium* cum stylo 6-sulcatum, stigmate capitato 3-lobo. *Fructus* ignoti.

NEW GUINEA. West New Guinea, 15 km SW of Bernhard Camp, Idenburg River, occasional on slopes, primary forest, 1780 m: *Brass & Versteegh 11198,* ♀ flow. (L, *type spec.*: A, type dupl.), tree 20 m, flower yellow-white, bark with a little colourless resin; Jan.

Remarks. Endemic. Undoubtedly close to the equally mountainous *H. ledermannii* whose leaves however, lack the glands. Unknown as yet are ♂ flowers and fruits.

2. **H. glandulosus** A. M. Husson, nov. spec. — *Fig. 3.*

Description of type specimen. — Arbor alta. *Ramuli* 0.3—0.5 cm diam., teretes, paulo striati et lenticillati, alabastro terminali minute pulveru-

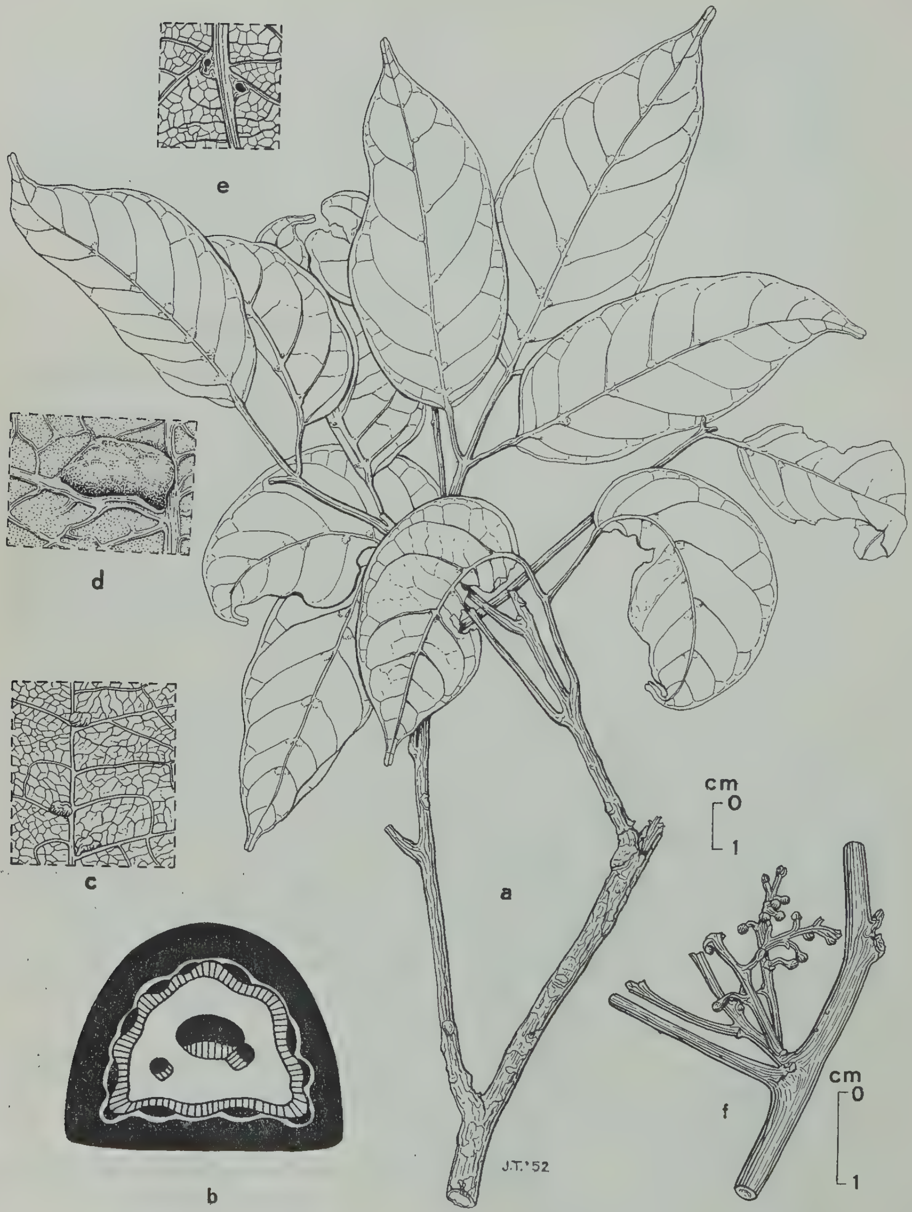


Fig. 3. — *H. glandulosus* A. M. Husson — a. branchlet with leaves; b. cross section of petiole; c, d. parts of leaflet with venation and glands, upper side; e. ditto, lower side; f. young inflorescence (sex undefinable) — a—e. from type dupl. (A), f. from type specimen (*Clemens 4988*, B).

lento, medulla aresinosa. *Folia* glabra, 1½—2½-jugata, 10—15 cm longa, petioli planoconvexi, 2.5—4.5 cm longi, medulla 1—3 fasciculis vasorum resiniferis percursa, rhachidis partes interjugales 1.5—2.5 cm longae; foliola rigide coriacea, ovata vel ellipsoidea, basi rotundata ad late acuta, apice breviter obtuse acuminata, 5—10.5 × 3—5.5 cm, petioluli laterales 1—1.5, terminales 2—3 cm longi; costa media supra haud, subtus vix prominens; nervi secundarii utrimque 6—9, subtus vix prominentes, angulo 50°—80° de costa adscendentes, curvati, prope marginem haud distincte arcuatim conjuncti, in eorum axillis glandulos ovatos supra conspicue bullatos 1—2 mm longos, marginibus saepe pilosellos gerentes; reticulatione utrimque perspicua haud minuta. *Inflorescentiae* (♀?, juveniles tantum videmus), furfuraceae, glabrescentes, i. s. atrae, e basi ramosae pauciflorae axillares, 1.5—2.5 cm longae, interdum alabastrum vegetativum, rare folium parvum gerentes. *Flores* adulti *fructus*que ignoti.

NEW GUINEA. East New Guinea, Morobe, Ogeramnang, in village, 1750 m in alt.: *J. & M. S. Clemens 4988*, y. fl. in Jan. (A, type dupl., ster.; B, *type specimen*, y. fl.), same locality: *J. & M. S. Clemens 4941a*, ster. (A).

Remarks. Endemic. *Clemens 4941a* is doubtless conspecific with the type specimen. On account of the peculiar glands in the axils of the nerves and the venation, the present species is obviously related to the equally mountainous *H. microphyllus* from which it differs by the much larger leaflets with much shorter acumina. Most akin, however, is the following species, *H. monticola*, which has still larger leaflets with smaller and hardly bullate glandular pits and a much wider reticulation, 2½—3½-jugate leaves and larger inflorescences without vegetative bud. The last-named character links *H. glandulosus* with *H. floribundus* (and some other species, cf General Part, sub 2d), a mainly lowland species with a considerable variability (see there), with a similar type of venation but without glandular pits. Other indubitable relatives are *H. nubigenus*, also a mountainous species, which is distinguished by much smaller leaves (½—1½-jugate) and smaller and more rigid leaflets, which occasionally show tiny glandular pits; and *H. monophyllus* which has prevailingly unifoliolate, long-petioled leaves, and domatia instead of glandular pits.

Unknown as yet are adult flowers and fruits.

3. **H. monticola** A. M. Husson, nov. spec. — *Fig. 4.*

Description of type specimen. — Arbor. *Ramuli* subgraciles, ca 0.3—0.6 cm diam., lenticellati, glabri, medulla compacta aresinosa suffulta. *Folia* 2½—3½-jugata; petioli robusti, in sicco striati, lenticellati, basi supra deplanati, basi nodisque articulati, 3.5—5 cm longi, rachidis partes interjugales 2—4.5 cm longae; medulla 1—3 fasciculis magnis resiniferis percursa; foliola oblonga vel oblongo-lanceolata, basi subinaequaliter rotundata ad acuta, apice breviter obtuso-acuminata, acumine 0.5—0.7 cm longo, chartacea, glabra, 10—16.5 × 4.5—5.5 cm, petioluli laterales 1.6—2.6 cm, terminales 4 cm longi; nervi secundarii utrimque 10—12, angulo 60°—75° de costa descendentes, supra haud, subtus conspicue prominentes, marginem folii versus curvati, diminuentes, praecipue in apice folii arcuatim conjuncti, in axillis et interdum in lamina inter nervos glandulos interdum margine pilosellos ovato-oblongos 0.5—1 mm longos gerentes; nervi tertiarii

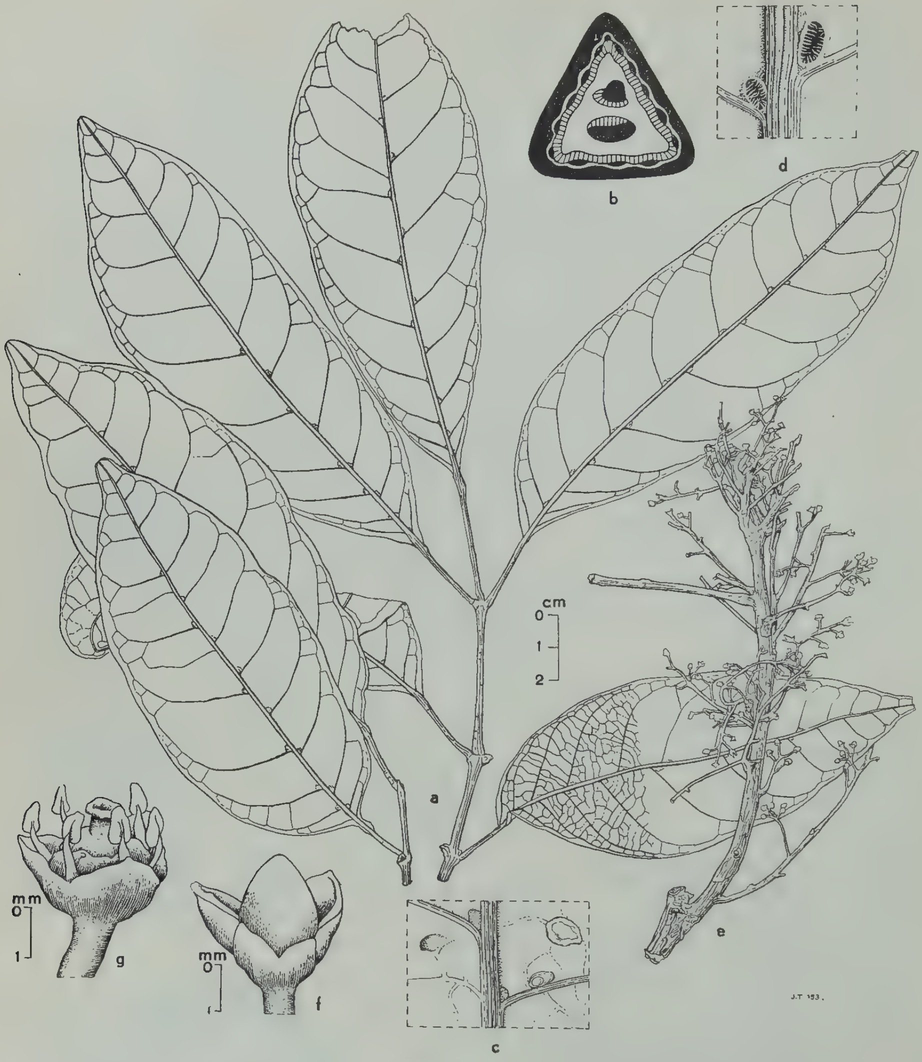


Fig. 4. — *H. monticola* A. M. Husson — a. leaves; b. cross section of petiole; c, d. glandular pits, below; e. branchlet with ♀ inflorescences; f. ♀ flower outside; g. ditto, without corolla — a—b, d—g. from type dupl. (*Clemens 1924*, A), c. from *Brass 13152*, L).

cum reticulatione laxa in sicco utrimque semper paulum conspicui atque subprominuli. *Inflorescentiae* ♂ ignotae, ♀ glabrae axillares, e basi ramosae, late paniculiformes, multiflorae, usque ad 7.5 cm longae, ramis laterales cymosis usque ad 1.5 cm longis, cymulis ultimis trifloris. *Flores* ♂ ignoti, ♀ glabri, minuti, 2 mm diam., pedicelli gracillimi basi bracteolis minutissimis praediti, 2—4 mm longi; *calyx* 3-fidus, sepalis late deltoideis brevibus;

petala 3 subimbricata ovata apice vix inflexo-incrassata obtusiuscula, 1.5—2 mm longa; *stamina* sterilia 6 monodynamia glabra, filamentis elongato-deltoideis basi liberis extus discum insertis, antheris deltoideis quam filamenta brevioribus. Discus crassus 6-undulatus glaber, quam ovarium dimidio brevior. *Ovarium* glabrum. *Fructus* ignoti.

NEW GUINEA. West New Guinet, Idenburg River, 4 km SW of Bernhard Camp, frequent tree of primary forest on ridge, 1000 m alt.: *Brass 13152*, ster. (A, L), tree, 26 m high, 0.6 m diam., bark black, scaly, with little colourless resin. — East New Guinea, Morobe District, Sattelberg, forest trail, about 1000 m: *J. & M. S. Clemens 1924* ♀ (A, type dupl.; B, *type spec.*); tree, 24—27 m, diam. breast high 0.6 m, ♀ fl. green, in March.

Remarks. Endemic. *Brass 13152* is certainly conspecific with the type, but the glands in the nerve axils on the few leaflets available, if any, are minute and hairless but there are mostly some larger and shallow additional ones on the blade between the nerves. The present species is undoubtedly related to *H. nubigenus*, which is also a mountain tree, sometimes showing small, hairless glands (*Brass 13152* shows a transition to this condition) in the nerve axils but there the leaves are only ½—2½-jugate, and the leaflets smaller and with much more minute reticulation.

Unknown as yet are ♂ flowers and fruits.

4. **H. ledermannii** (Lauterb.) H. J. Lam 1932a, 207; id. 1932b, 408. — *Santiria Ledermanni* Lauterbach, 1920, 334. — *Santiria caudata* Lauterb., l. c., 336. — Iconography: Lam 1932b, pl. VIII, fig. 41 (hab. and ♀ infl., part of leafl., ♂ flow., young fr., ripe fr. and cross section).

NEW GUINEA. East New Guinea, Sepik area, Etappenberg 850 m: *Ledermann 9013* old ♀ fl. (K, type dupl. of *Santiria Ledermanni, lectotype*); Lord Peak 1000 m: *Id. 9915* ♀? buds (K, L, type dupl. of *Santiria caudata*); same locality: *Id. 9877* ♀ (K, type dupl. of *S. caudata*).

Not examined (cf Lam 1932b): *Ledermann 11484, 12442a* ♀, *12506a* ♂ (all from Sepik area, type material of *Sant. caudata*).

Remarks. Endemic. It is proposed to select the Kew type duplicate of *Ledermann 9013* as the lectotype.

A characteristic mountain species with exceptionally small and delicate, yet 2½—4½-jugate leaves and only 1(—2) resiniferous ducts in the medulla of the petioles. Its nearest ally is probably *H. microphyllus*, which is distinguished by 1½—2½-jugate leaves with glandular pits on the leaflets.

Unknown as yet are ♀ flowers.

5. **H. acuminatus** (K. Schumann) H. J. Lam 1932a, 207; id. 1932b, 410. — *Santiria acuminata* K. Schumann in Schumann & Hollrung, Flora Kais. Wilh. land 1889, 64; Schumann & Lauterbach, Fl. D. Schützgeb. Südsee 1901, 378; Ridley, Transact. Linn. Soc. Lond., Bot. IX, 1916, 25; Lauterbach 1920, 337; idem, Nova Guinea XIV, 1924, 135; White, Journ. Arn. Arbor. 10, 1929, 227. — *Canarium pachypodum* Lauterb. 1920, 324. — *Haplolobus pachypodus* (Lauterb.) H. J. Lam 1932a, 207; id. 1932b, 411. — Iconography: Lam 1931, fig. 46 (vasc. supply of flow.); Lam 1932b, pl. VIII, fig. 43 (hab. and infl., ♂ flow., ♀ flow., infrut., *H. acum.*), fig. 44

(leafl., cross sections of branchlet and of petiole, ♂ infl. and flow., *H. pachyp.*); the present paper *Fig. 5* (fr.).

NEW GUINEA. West New Guinea, Andai: *Beccari P.P. 542* (= *Herb. Fir. 2220, 2220 A*), y. fr. (FI); Arfak Mts, Poetat (Putat), 300—600 m: *Beccari P.P. 876* (= *Herb. Fir. 2223, 2223 A, 2223 B*), fr. (FI), Oct.; Japen, Seroei, Mariattoe, 370 m: *NIFS bb. 30470,* ster. (BO, L); Mamberamo-area, "Pionierbivak": *Lam 705,* ♀ fl. in July (BO, L) — East New Guinea, Sepik-area: Malu, low alt.: *Ledermann 10390,* y. fr. in March (L); April riv., 200—400 m: *Ledermann 9724,* ♂ fl. in Nov., typ. dupl. of *Can. pach.* (K, L); Augusta riv.: *Hollrung 737,* ♂ fl., typ. dupl. of *Sant. acum.* (K, *lectotype*; L, MEL [one leaflet only], P); Garamambu: *NGF 3754*, ster., tree up to 24 m, buttressed to 0.6 m, diam. breast high up to 0.45 cm, bole usually curved, wood white, one of the commonest trees round Garamambu, but millable trees are rare (BO, L); Papua, Iawawere, 450 m alt.: *Brass 685* (corrected from 625), ♂ fl. in Nov. (A).

Not examined (cf Lam 1932b): *Boden Kloss s.n.* ♂ (S. New Guinea, foot of Mt Carstensz); *Ledermann 7806, 10393* fr., *11548* ♂ (all Sepik area).

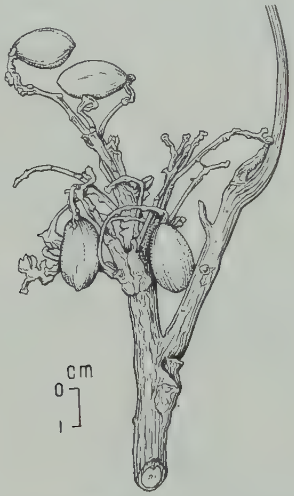


Fig. 5. — *H. acuminatus* (K. Schum.) H. J. Lam — branchlet with infrutescences and fruits — from *Beccari P.P. 876* (FI).

Remarks. Endemic. As the Berlin type has got lost, it is suggested to select the Kew duplicate of *Hollrung 737*, which is the best preserved and most complete one, as the lectotype.

The types of *Santiria acuminata* and *Canarium pachypodum* are undoubtedly conspecific, though in the latter the leaves seem to be generally somewhat less pubescent. The number of resiniferous ducts in the medulla of the petioles, which in some species is fairly constant, is strongly variable here: we found 2—17 ducts in petioles of one type specimen (*Ledermann 9724*) and 4—5 in the other (*Hollrung 737*). This variability is due to the degree of confluence of the ducts on the lower (round) side of the petiole.

Certainly conspecific are also *Ledermann 10390* (2—6 res. ducts), *Lam 705* (10 r. d.), *Beccari 876* (6—8 r. d.), and *Brass 685* (8—9 r. d.).

In all the above-mentioned specimens, the leaflets are rather large and dark reddish brown when dry, with 10—20 secundary nerves. In the other specimens, however, this colour is more or less greenish or at least not reddish brown and the leaflets are mostly smaller and narrower and with fewer secondary nerves (7—11), the pubescence being also generally more dense, but as there are transitional forms regarding all of these characters and fundamental differences seem to be wanting, we could give these specimens not even varietal rank. The number of resiniferous ducts in the petiole is 7—9 in *Beccari 542* and *NIFS bb. 30470* and 9—13 in *NGF 3754*. The last-named specimen has larger and more brownish leaflets.

Beccari 542 states on separate labels: "gen. nov.?" and, after a short diagnosis in italian: "Cotiledoni crassi piano-convessi — questo carattere diff. dalle Sintiria". (sic; the field label says *Santiria*). See also remarks under *H. leeifolius*.

In general, *H. acuminatus* seems to be a rather variable and widespread endemic species of the lowland and the lower hills. It is most clearly characterised by the pubescence on young parts and inflorescences and on the petioles, rachides, and lower side of the leaflets, the upper side showing a more or less distinct pulverulence on the midrib only, if any. The leaves are 1½—3½-jugate and the leaflets, which are not too rigid, show a marked prominence of the nervation underneath. The inflorescences of both sexes are comparatively short, the more or less dense and many-flowered ♂ ones up to 12, the more lax ♀ ones only up to 7 cm (even in fruit), the lateral ramifications being relatively short in either case. Mature fruits are 1.3—1.9 by 0.8—1.2 cm (*Fig. 5*) and are said to be olive-green (*Beccari 876*) or red (Ledermann 1920, 337).

Its relation is with *H. robustus* which differs by its rigid leaflets with abrupt and short acumens and its longer and much broader (♀) inflorescences; and probably with *H. maluensis* which is different by its want of pubescence (leafshape and nervation are much like those in *H. acuminatus*) and its longer and more lax inflorescences.

6. **H. robustus** H. J. Lam, nov. spec. — *Fig. 6.* — Arbor. Innovationes, inflorescentiae, folia dense fusco-pubescentes. *Ramuli* teretes c. 1 cm crassi medulla aresinosa. *Folia* 2½—3½-jugata, petioli cum rhachide dense lanuginosi planoconvexi, 7 cm vel ultra longi, c. 0.4 cm crassi, medulla fasciculis resiniferis c. 15 percursa; rhachidis partes interjugales 3—4 cm longae; foliola rigida oblonga, terminalia oblongo-obovata, omnia basi aequaliter vel paulo oblique rotundata ad paululo cordata, apice breviter abrupte obtuse acuminata, subtus omnino lanuginoso-pubescentia, supra costa media pubescente excepta glabra, i. s. brunneo-griseo-viridia, subtus subfusca, 14—21 cm longa, 6—9 cm lata, petiolulis pubescentibus 0.3 cm crassis rigidis haud articulatis, lateralibus c. 1 cm, terminalibus 2.5—3.5 cm longis, acuminibus gracilibus 0.5—1 cm longis; costa media cum nervis secundariis subtus valde prominens, supra minute canaliculata; nervi secundarii 12—16, angulo c. 70° de costa adscendentes, mox curvati, marginem versus diminuti, in apice folii tantum leviter arcuatim conjuncti, tertiarii supra per reticulationem minutam superficialem vix conspicui, subtus prominuli

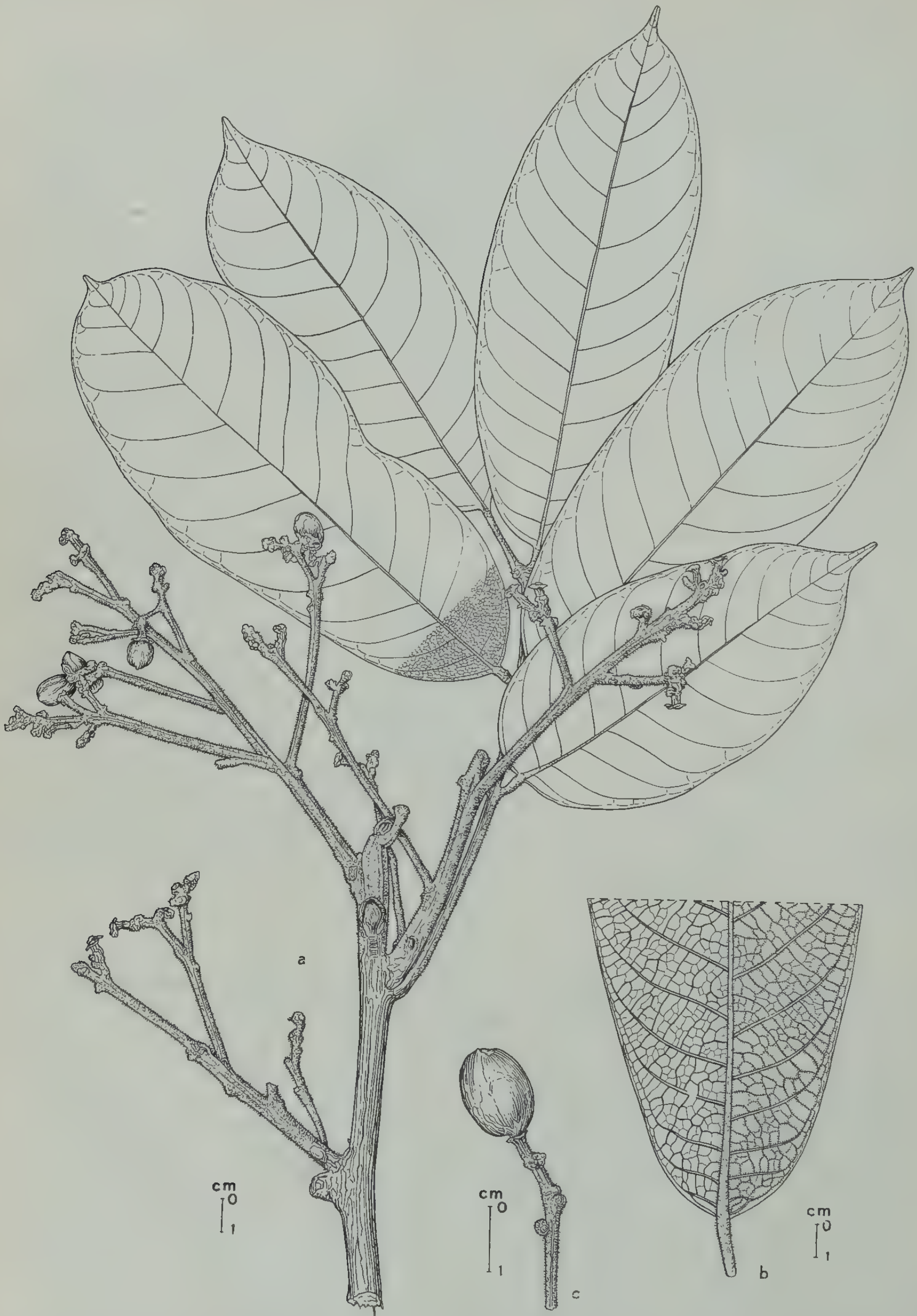


Fig. 6. — *H. robustus* H. J. Lam — a. branchlet with leaves and infrutescences; b. part of leaflet showing venation and pubescence; c. fruit — from type specimen (*Brass & Versteegh 13111*, L).

perspicui, transversi, angulo c. 150° de costa divergentes, haud proximi, prope costam eam perpendiculariter affluentes, reticulatione paulo conspicua. *Inflorescentiae flores*que ignoti. *Infrutescentiae* axillares robustae dense lanuginoso-pubescentes, rigidae, 10—13 cm longae, ramificationes infimae 3.5—8.5 cm longae, pedunculo 0.3—0.7 cm crasso, pedicellis 0.3—0.4 cm longis, 0.2—0.3 cm crassis. *Calyx* persistens extus pubescens, intus glaber, c. 0.4 cm diam.. *Fructus* maturi subpisiformes 1—1.3 × 0.7—1 cm, nigri, pericarpio tenui, monospermi, cotyledones planae, crassae.

NEW GUINEA. West New Guinea, North slope of Central Range, Idenburg Riv., 4 km SW of Bernhard camp, in primary rain forest on flat plain, 850 m alt.: *Brass & Versteegh 13111* ♀ (L, *type spec.*; A), frequent tree, 19 m high, 41 cm diam., bark 0.9 cm thick, brown, scaly, with some colourless resin, wood light yellow, ripe fruit black, March 1939.

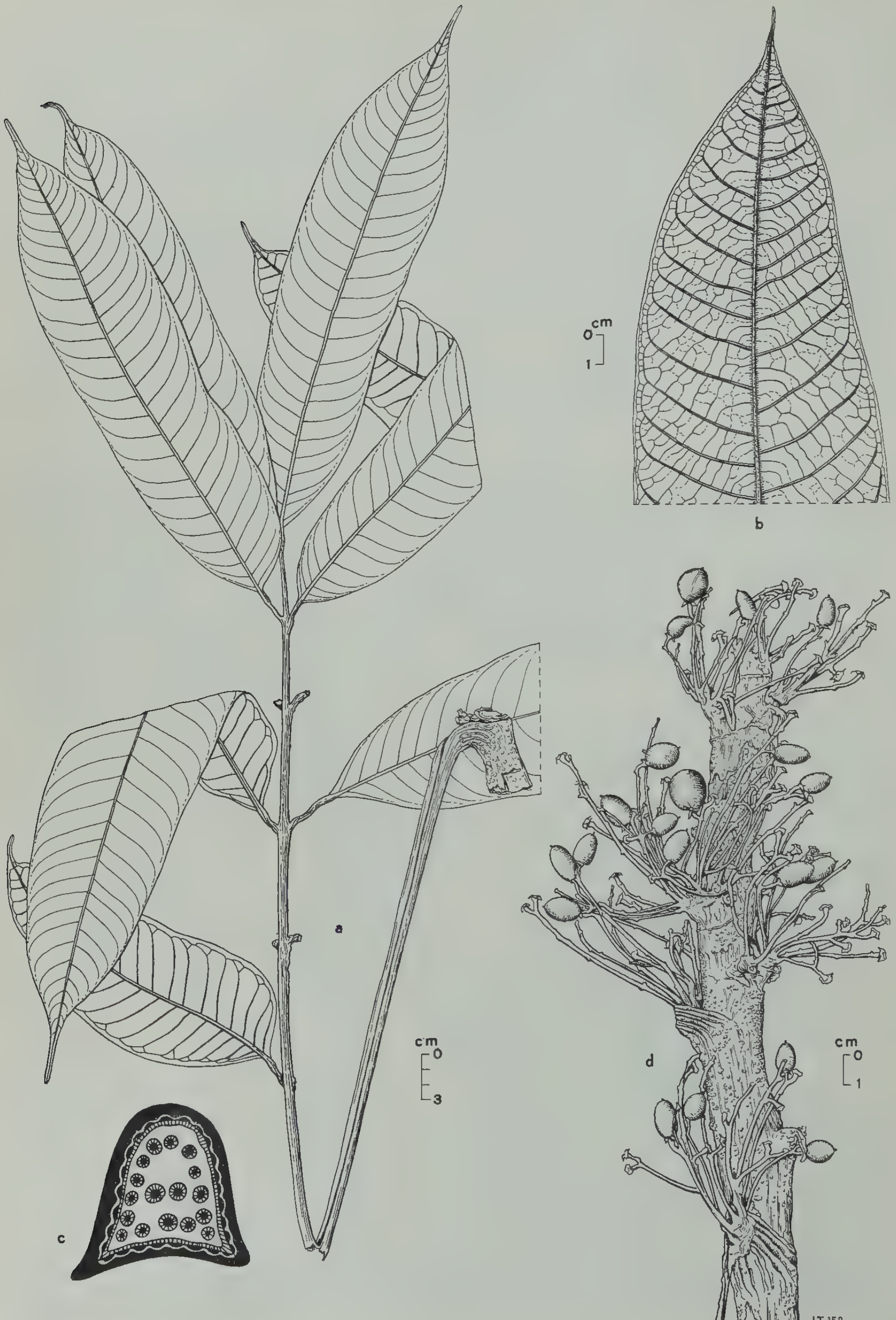
Remarks. Endemic. A characteristic species, apparently related to *H. acuminatus* but distinguished by the rigid, oblong leaflets, the robust branchlets and infrutescences and the long and broad panicles.

As yet flowers of either sex are unknown.

7. **H. beccarii** A. M. Husson, nov. spec. — *Fig. 7.* — Arbor. *Ramuli* crassi, 1.7—2.2 cm diam., teretes, sublaeves, lenticelloso-verrucosi, medulla compacta aresinosa. *Folium* (unum incompletum tantum vidi) 6½-jugatum; petiolus robustus, lenticellatus, in sicco striatus, ca 23 cm longus, basi 11—13 mm diam., late canaliculatus, medulla 15—20 fasciculis vasorum resiniferorum percursa, rachidis partes interjugales 8—8.5 cm longae subteretes vel paulo deplanatae; foliola chartacea oblongo-lanceolata, basi acuta, saepe plus minusve inaequilateralia, apice subabrupte longe acuteque acuminata, acumine 1.5—2 cm longo, 1—3 mm lato, in sicco supra olivacea, nitidula, subtus fusca, 21—36 cm longa, 7.5—10 cm lata; petioluli laterales utrimque articulati, ca 2 cm longi, terminales?; costa media cum nervis secundariis supra haud, subtus valde prominentes et pubescentes, nervi secundarii 25—30, angulo 70°—80° de costa adscendentes, prope marginem arcuatim conjuncti; nervi tertiarii cum reticulatione in sicco supra vix, subtus conspicue prominentes et subpubescentes. *Inflorescentiae flores*que ignoti. *Infrutescentiae* axillares, dense minutissime pubescentes, ex ima basi ramosae vel pedunculo brevi suffultae, 4—7 cm longae; *calyx* (vel calycis rudimenta) ca 3 mm diam., fructus pedicello 3—5 mm longo. *Fructus* immaturi oblongi vel ellipsoidei, maturi autem subglobosi, apice styli rudimento coronati, glabri, in sicco fusco-nigricantes, maiores 13—15 mm longi, ca 12 mm diam., cotyledones plano-convexae.

BORNEO. Sarawak, Mattang: *Beccari P.B. 1803* (= *Herb. Fir. 2217, 2217 A*), fr. (FI, *type spec.*), June.

Remarks. The most striking characters of this second species of *Haplolobus* recorded from Borneo, are the very long and narrow leaflets, the usually great number of secondary nerves, and the short, many-branched inflorescences. Curiously enough, the relation is not with the only other Bornean species thusfar known, viz. *H. borneensis*, which is a small-leafed mountain species from Mt Kinabalu with, as is not unusual, relations to Moluccan and Papuan species. *H. beccarii* stands quite apart in the genus (as far as this term is applicable to *Haplolobus* at all), and its only relation might be *H. acuminatus*, which tallies with it in its pubes-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cence and short inflorescences but is otherwise quite different. The exceptionally large and multifoliolate leaves recall certain *Canarium* species.

Flowers of either sex are thusfar unknown.

Named in honour of its discoverer, whose name should, on account of his extraordinary scrutiny, have been used to form the generic name, had the material not been stored away a long time. It is due to the tracking sense and the organisatory talent of Dr. C. G. G. J. van Steenis (cf. lit. 9) as well as to the kind and energetic cooperation of the Director of the Florence Herbarium Prof. R. E. G. Pichi-Sermolli, that the rich material of this gifted botanist and collector is now open to investigation. For quotations from Beccari's field labels see under *H. leeifolius* and *H. acuminatus*.

8. **H. moluccanus** H. J. Lam 1932a, 207; id. 1932b, 407. — Iconography: Lam 1931, fig. 45 (♂ flow. and its vascular supply); id. 1932a, fig. 60 (♂ flow. and diagr.); idem 1932b, pl. VIII, fig. 40 (leafl., cross sect. of petiole, ♂ infl., and fr.).

MOLUCCAS. Halmaheira, W. Pitu, 40 m: *Beguin 2225* ♂ Oct. (L, *type spec.*; BO); W. Tobelo, 30 m: *Beguin 2301* ster. (BO, L); Weda, Tiloppe, fairly frequent in old forest on slope, 25 m: *NIFS bb. 24847* ♂ Apr. (BO, L), tree, 16 m high, diam. 0.35 m, bark with some black resin, nat. n.: damar tai babi (mal.), ode mayoko (tob.) — Morotai, West Coast, frequent in old forest, 20—130 m: *Lam 3550, 3583, 3653*, all ster. (BO, L); Ai N. Totoduku, old forest on slope, 30 m: *NIFS bb. 33782* (= *Kostermans 88*), ster. (BO, L), tree, 23 m high, 0.30 m diam., nat. n.: liana (tob.). — Batjan, Masurung, in old forest on steep river bank, 500 m: *NIFS bb. 23153*, ster. (BO, L), nat. n.: dian (alf.).

Not examined (cf Lam 1932b): *Beguin 1902* fr. (Halmaheira, BO). The tree grown in Hortus Bogoriensis sub VI. B. 83 is not an *Haplolobus* but probably a *Canarium*.

Remarks. Though several specimens are sterile, the conspecifity of all quoted above seems to be beyond doubt. *H. moluccanus* belongs to a large and wide-spread population of forms in which specific delimitations are very hard to distinguish. Any subdivision seems more or less arbitrary. This group ranges from Celebes to East New Guinea and perhaps New Britain. Generally speaking, the size of the leaflets, their width, and the dimensions of the inflorescences seem to decrease from W to E, and the same is true for the number of resiniferous ducts in the petiole. There are, however, some irregularities and in cases of — the numerous — sterile specimens it is often impossible to state their proper taxonomic position.

In the population under discussion, *H. moluccanus* is characterized by large, rather thin, broad leaflets, up to 38 × 18 cm, and about 2—2½ times as long as wide, and with a broad, more or less rounded base and a rather abrupt apex. The number of resiniferous ducts is rather variable but always high. Some examples are: *Beguin 2225*: 15—18; *Beguin 2301*: 25—40!; *NIFS bb. 24847*: 14—19; *Lam 3583*: 20; *Lam 3653*: 16; *Lam 3550*: 20; *NIFS bb. 33782*: 10—12!; *NIFS bb. 23153*: 18—19.

As to the other species of the group there is some doubt and some

Fig. 7. — *H. beccarii* A. M. Husson — a. leaf; b. part of leaflet showing venation and pubescence; c. cross section of petiole; d. branch with infrutescences and fruits — from type specimen (*Beccari P.B. 1803*, FI).

particular difficulty. They are *H. celebicus, H. anisander, H. floribundus* and *H. maluensis.* The doubt concerns the possible conspecifity of *H. celebicus, H. anisander* and *floribundus,* the difficulty is due to the fact that the type material of *H. maluensis* seems to be lost, the only evidence of the characters and relationship of this species being its description by Lauterbach (1920) and Lam (1932b) and a plate, made under the latter's supervision, parts from which were published in his paper just quoted and elsewhere (see p. 436). Female flowers are still unknown.

For the time being we preferred to keep on the safe side and con-

	leaflets	nr of resin. ducts in pet.	inflorescences (infrutescences)
H. moluccanus (Moluccas)	large and broad, i.s. often greenish, 12—38 × 7—18 cm, base more or less rounded	10—40	large, lax, slender, manyflorous, axillary. ♂ : 23–32 cm long ♀ : 7–19 cm long (fr.)
H. celebicus (Celebes; Moluccas ?)	smaller and narrower, i.s. often greenish, 9—21× 4—10 cm, base or less acute	(1—)4—9	large, lax, slender, manyflorous, axillary. ♂ : 10–22 cm long ♀ : ± 10 cm long (fr.)
H. maluensis (New Guinea)	broad ovate with rounded base; 5—21 × 2—8 cm	10—12	rather large, rigid, not manyflorous, axillary. ♂ : 5–13 cm long ♀ : 2.5–10 cm long
H. floribundus (New Guinea)	oblong, rather narrow and rigid, i.s. mostly brownish, with dense reticulation above, base more or less broadly acute, apex long acuminate, 7—19×3—9 cm	1—4(—11)	large and rigid, axillary and terminal. ♂ : 8–23(–28) cm long ♀ : 4–14 cm long, few-flowered
H. anisander (Moluccas, New Guinea, New Britain)	small and thin, base often acute, i.s. mostly greenish, 6—12 × 2—5 cm	1—4(--5)	small, slender, axillary, few-flowered. ♂ : 1–8 cm long ♀ : ± 4 cm long

sider these species separate. The main difficulty is that the type specimens are widely different, but these are almost gaplessly linked by many unidentifiable sterile specimens. More flowering and fruiting material will be necessary to decide where the specific and geographic borderlines, if any, lie. For further particulars the reader may be referred to the "Remarks" under the species in question. Provisionally, the following gross distinction, mainly based on the type specimens, may serve as a guide (cf Table on p. 434).

9. **H. celebicus** H. J. Lam, 1938a, 111, with plate.

CELEBES. Central Celebes, Malili, Toletole, Kawata, 250 m: *FRI Cel./V-208*, ♂ fl. Oct., (BO; L, *type spec.*); ibidem, 200 m, steep slope: *FRI Cel./V-312*, fr. March (BO, L), tree 25 m high, 0.3—0.35 m in diam.; ibidem, Usu, 25 m, old forest on slope: *FRI bb. 32604*, ster. (BO, K, L), tree 30 m, diam. 0.7 m, nat. n.: bakata putih; ibidem: *FRI bb. 32598*, ster. (BO, L), tree, 20 m high, 0.45 m diam., nat. n.: tapitapi; Masamba Mina, 50 m: *NIFS bb. 24500*, ster. (BO, L); Poso, Dondo, 35 m alt.: *NIFS bb. 31901*, ster. (BO, L).

Distribution: Celebes, Moluccas?

Remarks. The nearest relative is *H. moluccanus*, which differs from *H. celebicus* by its generally broader leaflets with much more numerous resiniferous ducts in the medulla of the petioles. Whether a certain specimen should be named *celebicus* or *moluccanus*, however, is sometimes doubtful as broader leaflets approaching the *moluccanus* type are sometimes found in sterile specimens from Celebes (*bb. 31901*), in which case the number of resiniferous ducts (in casu: 5—8) has been assumed as the decisive character. In one case of a sterile specimen the choice had even to be made on the locality:

CELEBES. Central Celebes, Poso, 30 m alt.: *NIFS bb. 31850*, ster. (BO, L), leaflets rather broad and short, leaves slender like those of *H. anisander* (see there!); r. d. 5.

In the typical *celebicus* the leaflets are rather thin, ovate to narrowly oblong, often greenish when dry with a dark midrib, with a more or less acute base and a blunty acuminate apex, the number of resiniferous ducts being 4—9; only in one case (*FRI Cel./V-312*) this number was found to be 1—4 (cf. Remarks under *H. moluccanus*, where the lowest number found is 10—12). In *H. celebicus* the leaflets are 12—21 × 3.5—8.5 cm but the smaller and narrower ones are in the majority. On the other hand, *H. celebicus* is clearly allied with *H. floribundus* and *H. anisander* which have both leaflets of the same type as the narrower *celebicus* specimens. *H. floribundus*, however, has stiffer leaflets and fairly large and spreading, often subterminal inflorescences, and seems restricted to New Guinea. *H. anisander*, on the other hand, in the delimitation here accepted, occurs from the Moluccas to East New Guinea or even New Britain and is particularly difficult to keep apart from *H. celebicus* in sterile specimens. Its inflorescences are much smaller than in the last-named species, and the number of resiniferous ducts is mostly low (1—5). For further particulars see under *H. floribundus* and *H. anisander*.

So far, ♀ flowers are still unknown.

The following specimens are inserted here with doubt. They are certainly conspecific amongst themselves, but they could as well belong to *H. celebicus* (though the leaflets are generally smaller and more rigid and also more brownish when dry than in the typical specimens of that species) as to *H. floribundus* (from which they slightly differ in the nervation) whose area we hesitated to extend beyond the Papuan mainland, since the New Guinea specimens show a more dense and more prominent reticulation on the upper side of the leaflets (r. d. = resiniferous ducts):

MOLUCCAS. Sula, Sanana, Fowata, along Wai Busa, 260 m alt.: *NIFS bb. 28840*, ster. (BO, L), r. d.: 1; ibidem, Sanana, Kabau, 150 m alt.: *NIFS bb. 28871*, ster. (BO, L), r. d.: 1—2 — Batjan, Saoran Domut, very frequent in old forest, on slope, 50 m alt.: *NIFS bb. 23182*, ster. (BO, L), r. d.: 1, nat. n.: palano putih — Morotai, Kali Sangowo, frequent, 150 m alt.: *Main & Aden (Exp. Kostermans) 1417*, ster. (A, BISH, BM, BO, BRI, CAL, K, LAE, L, NY, P, PNH, SING), r. d.: 1; tree 25 m, diam. 0.5 m, wood pale yellow.

The leaflets of all of these doubtful specimens (which seem conspecific amongst themselves) are smaller than is usual in the species (6—12—17 × 2—5—6.5 cm) and the number of resiniferous ducts is only 1—2. They are mostly oblong, with a broadly to narrowly acute base, and their reticulation is not dense but rather like that of *H. celebicus*.

10. H. maluensis (Lauterb.) H. J. Lam 1932a, 208; id. 1932b, 416. — *Santiria maluensis* Lauterbach 1920, 334. — Iconography: Lam 1932a, fig. 97 (♂ and ♀ flow.); idem 1932b, pl. VIII, fig. 49 (leafl. and ♀ inflor., cross sect. of petiole, infrut.); the present paper, *Fig. 8*.

Distribution: New Guinea. N.E. Guinea, Sepik region, Malu, April river.

Remarks. We did not see any material of this species. However, in the collection of the Rijksherbarium there is an unpublished figure made under the supervision of the senior author, showing leaves, fruits, male and female flowers of the type of this species. All the type material having been destroyed during the Berlin Herbarium fire and none of the other herbaria, which we asked for informations concerning type duplicates, possessing any such material, the only data available concerning the species are the descriptions by Lauterbach and Lam, the small figures published by Lam and the above mentioned unpublished figure. For this reason it seems worth while to publish the latter. It is proposed to consider this plate the type specimen in case no duplicate turns up. It is made from Ledermann's type material (*Ledermann 6548* fr., *7804* ♀, *8082* fr., *9691* ♂). In addition we did not examine (cf. Lam 1932b): *Ledermann 6605, 7794, 8612, 10396, 10708* (all fruiting from Sepik area). For relations to other species see under *H. moluccanus*. It may be added here that there is possibly also a relation to *H. acuminatus* in leaf shape and nervation, but the leaflets show no trace of pubescence.

Possibly the following specimen belongs here:

NEW GUINEA, West New Guinea, Geelvink bay, Nabire, in rain forest 2 m in alt.: *Kanehira & Hatusima 11522*, fr. black in Febr. 1940, small tree, 3 m high (A.). — Three leaflets (14—19 × 8—9 cm) and infrutescences (3—5 cm long) with olive-shaped fruits (2 × 1.4 cm), cotyledons planoconvex.

11. H. floribundus (K. Schum.) H. J. Lam 1932a, 207; id. 1932b, 412. — *Santiria floribunda* K. Schumann in Schumann & Hollrung, Fl. Kais.

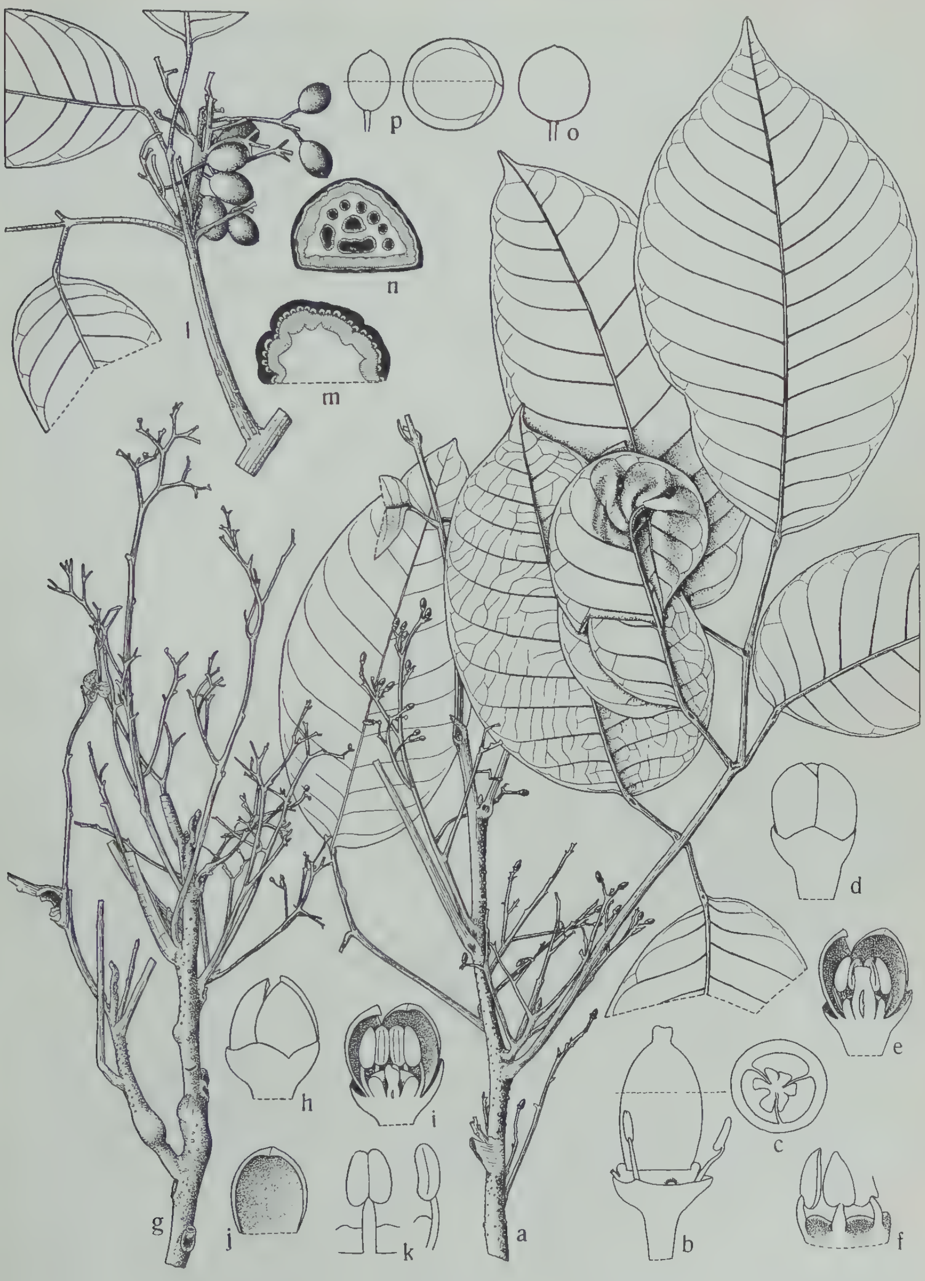


Fig. 8. — *H. maluensis* (Lauterb.) H. J. Lam — a. branchlet with young infrutescences; b. young fruit; c. ditto, cross-section; d. ♀ flower; e. ditto, longitudinal section; f. stamens and disc of ♀ flower; g. branchlet with ♂ inflorescences; h. ♂ flower; i. ditto, longitudinal section; k. stamens and disc of ♂ flower; l. branchlet with infrutescences; m. cross-section of branchlet; n. ditto of petiole; o. fruit; p. ditto, with cross-section — from Lauterbach's type material: a—c. *Ledermann 7804* ♀; d—f. *idem 8082* ♀; g—k. *idem 9691* ♂; l—p. *idem 6548* ♀.

Wilh.land 1889, 63; Schumann & Lauterbach, Fl. D. Schutzgeb. Südsee 1901, 378; Lauterbach 1920, 333 — *Canarium furfuraceum* Lauterbach 1920, 325 — *Santiria sepikensis* Lauterbach 1920, 333 — *H. furfuraceus* (Lauterb.) H. J. Lam 1932a, 207; id. 1932b, 409 — *Haplolobus sepikensis* (Lauterb.) H. J. Lam 1932a, 208; id. 1932b, 416 — Iconography: Lam 1932a, fig. 62 (♂ flow., *H. sepik.*), fig. 63 (♀ flow., *H. furf.*); idem 1932b, pl. VIII, fig. 48 (leafl., infrut., ♂ flow., and fr. of *H. sepik.*), fig. 42 (leafl., ♂ infl., ♂ and ♀ flow. of *H. furf.*), and fig. 45 (branchl. with ♂ infl. and ♂ flow. of *H. florib.*).

The three type duplicates left, viz. *Hollrung 543* (*Sant. flor.*), *Ledermann 9796* (*Can. furf.*), and *Ledermann 10455* (*Sant. sepik.*) are hard to compare. The two former represent ♂ plants with large and broad, axillary or subterminal inflorescences, the latter is a ♀ one with short, subterminal infrutescences and a few leaflets. Much additional material, however, has in the mean time come to our knowledge, more or less clearly linking up the scanty types just quoted, as well as the descriptions, given by Lauterbach and Lam (l. l. c. c.). It may be listed as follows:

NEW GUINEA, West New Guinea, Manokwari, Momi, old forest on flat land, scattered, 10 m alt.: *NIFS bb. 33437*, ster. (BO, L), tree, nat. n.: bowi; ibidem, fairly frequent: *NIFS bb. 33468*, ster. (BO, L), buttressed tree, nat. n.: jakko; Biak, Seroei, 50 m alt.: *NIFS bb. 30840*, ster. (BO, L); ibidem: *NIFS bb. 30692*, ster. (A, BO, L); ibidem: *NIFS bb. 30694*, ster. (BO, L); ibidem, 80 m alt.: *NIFS bb. 30722*, very young infl. Sept. (BO, L); ibidem: *NIFS bb. 30777*, ster. (A, BO, L); ibidem: *NIFS bb. 30764*, young infl. (prob. ♂), (A, BO, L); Mamberamo-area, "Pionierbivak", 35 m alt.: *NIFS bb. 31079*, ster. (BO, L); Hollandia, 50 m alt.: *NIFS bb. 25088*, infr. with immature fr. (BO, L) and ♀ inflor. (A), July; ibidem 40 m, old forest on slope: *NIFS bb. 25095*, flowerless infl. in July (A, BO, L), young tree, 10 m high; ibidem, Nimboeran, Berap: *NIFS bb. 28970*, ster. (BO, L); ibidem, along road from Netar to coast, in Cyclope Mts, 900 m: *NIFS bb. 25015*, young infrut. (BO, L) — South New Guinea, Upper Digoel, 15 m alt.: *NIFS bb. 14536*, ster. (BO, L); Papua, Koitaki, 450 m alt., in forest: *Carr 12247*, fr. purplish black in May (BM, L) — East New Guinea, Sepik area, Malu, 50—100 m: *Ledermann 10455*, fr. in Jan. (L, type dupl. of *Sant. sepik.*); ibidem, April riv., 2—400 m: *Ledermann 9796*, ♂ buds in Nov. (L, type dupl. of *Can. furf.*); Morobe dist., Lae: *NGF 925*, ster. (LAE, L); same locality, rain forest, 8 m alt.: *NGF 1564*, ♀ (LAE, L), tree, 30 m high, bole 18 m, buttressed to 1 m, diam. 0.75 m, bark brownish with grey patches, gum colourless, sapwood pale yellow-brown darkening gradually to a brownish heart, flow. (♀) greenish yellow; Constantinhafen: *Hollrung 543*, ♂ flow. (K, *lectotype*; MEL, P, type dupl.): Sattelberg, above Heldsbach, cart road jungle, 450—600 m alt.: *J. & M. S. Clemens 846*, ♂ flow. (A, B, L), buds green, in Nov.; same locality, 600—900 m: *Clemens 1752*, ♂ flow. (L) in June; Milne Bay, ½ mile S of Waigani Plantation, swampy flat, 9 m alt.: *NGF* 1312, fr. (LAE, L), tree 36 m, bole 24 m, buttressed to 1.8 m, diam. 0.6 m, bark greyish, gum whitish or colourless, sapwood white to pale straw, heartwood straw coloured, fr. blackish, nat. n.: ratitunga.

Not examined (cf Lam 1932b): *FRI bb. 15892* (Manokwari: sub *H. furfuraceus*): *Ledermann 7507, 7766* ♀, *8041, 10398* ♂, *12249* ♀ (all from Sepik area; sub *H. furfuraceus*, type material of *Can. furf.*); *Ledermann 7397* ♂, *10646* fr. (both from Sepik area, sub *H. sepikensis*; *7397, type spec. Sant. sepik.*).

Remarks. In the above delimitation *H. floribundus* seems to be a widely spread and variable species, endemic in New Guinea. Since the type specimen seems to be destroyed, it is proposed to assume the Kew duplicate of *Hollrung 543* as the lectotype of the species. *H. floribundus* seems to be mainly a lowland species, but this impression may be due to insufficient collecting; three widely apart localities (Cyclope Mts, Sattelberg, Papua) mention altitudes between 450 and 600—900 m.

The variability is wide and involves both leaves and inflorescences. However, the nervation of the leaflets, which are mostly fairly rigid, generally shows a characteristic more or less minute reticulation particularly on the lower side. Their shape may vary between small and narrowly oblong (e. g. 10 × 3.5 cm) to larger and broad (e. g. 15—17 × 6.5—9 cm), but there are specimens (*NIFS bb. 25088*) in which they are very long and narrow (up to 20 × 5.5 cm). In the Biak specimens they are of the small and narrow type (cf Remarks to *H. anisander*), though larger and broader ones are sometimes found on the same specimen (e. g. *NIFS bb. 30692*). In the sterile *NIFS bb. 31079* they are small and broad (up to 8 × 4.5 cm) with 1—2 r. d. in the petiole.

The number of resiniferous ducts in the medulla of the petioles varies between 1 and 11. The Biak specimens have mostly only 1, sometimes 2 r.d., *NIFS bb. 25088* varies between 4 and 11, the Hollandia specimens between 1 and 4 and the others between 3 and 8 (cf Remarks under *H. acuminatus* and *H. celebicus*).

As far as the material available allows to state, a striking characteristic of *H. floribundus* is the sometimes terminal (next to axillary) inflorescences. This feature is common to both sexes. For the male one it is particularly found in the type duplicate of *Canarium furfuraceum* (*Ledermann 9796*). Obsolete vegetative buds are not rare in these inflorescences, as may occasionally occur in some other species (cf. General Part, sub 2 d). The following specimens may be mentioned here in these respects.

NIFS bb. 30722, Biak: very young inflorescences axillary; nothing can be inferred from these.

NIFS bb. 30764, Biak: very young, possibly ♂ inflorescences axillary and terminal, the latter with a distinct vegetative terminal bud (which involves that on development of this bud the inflorescences would automatically become separated and individually axillary); axillary ones are 1.5 cm long, the whole terminal inflorescence, which is furfuraceous, 3 cm long and 2 cm wide. The same is true for *NIFS bb. 25095*, the sex of which is unknown since all flowers have fallen.

NIFS bb. 25088, Hollandia: this specimen is particularly interesting since one sheet shows a short ♀ inflorescence with almost mature flower buds and the other long infrutescences with immature fruits. This demonstrates the difference in length. The female inflorescence is axillary to the uppermost leaf, furfuraceous, and 3.5 cm long, 1.5 cm wide. There is no vegetative terminal bud. The three infrutescences, equally without a distinct terminal bud, are axillary to the uppermost leaves, mostly branched from the base (as are the young inflorescences), and 10—14 cm long without the fruits, the lowest ramifications measuring 5—8.5 cm.

NIFS bb. 25015, Hollandia: young infrutescences on axillary, few-leafed shoots with a vegetative terminal bud, both near and some distance from the branch tip, the whole shoot 4.5—8 cm long and branched from the base.

Carr 12247, Papua: infrutescences with mature fruits, which are shining black when dry, several together in the upper leaf axils, widely branched from the base with often an apparently obsolete and overtopped vegetative bud near the base, 8—12 cm long, lower ramifications 5—8.5 cm long; branches black when dry, angular and glabrous; fruits olive-shaped.

Ledermann 10455 (type dupl. of *Sant. sepik.*), Sepik area: infrutescences axillary to uppermost leaves (fruits detached), 5.5—6 cm long, some apparently (sub)terminal.

Ledermann 9796 (type dupl. of *Can. furf.*), Sepik area: ♂ inflorescences axillary and distinctly terminal without distinct vegetative bud, axillary ones about 8 cm long, pedunculate, terminal ones widely branched, at least 21 cm long and 16 cm wide on the sheet.

NGF 1564, Lae: young ♀ inflorescences terminal on one-leafed axillary shoots, which are 7—8 cm long, subglabrous and dark-brown when dry.

Hollrung 543 (type of *Sant. flor.*), Constantinhafen, has large and broad ♂ inflorescences in the upper leaf axils, 8—13.5 cm long and without vegetative buds.

In the Clemens specimens (*Clemens 846* and *1752*), Sattelberg, the ♂ inflorescences are of the same type but longer (up to 17 cm long) and less broadly branched at the base, thus resembling those of *Ledermann 9796,* the type duplicate of *Canarium furfuraceum.* Moreover, *Clemens 846* generally recalls *H. aneityensis* from the Western Pacific (see there).

NGF 1312, Milne Bay: infrutescences axillary to the uppermost leaves, without the fruits only 4—6 cm long, branches black and angular, glabrous, branched from the base; fruits ovoid to subglobular.

In the above material the leaves are, within the limits of variability, stated above, perfectly conformable.

12. H. versteeghii H. J. Lam, nov. spec. — *Fig. 9.* — Description of type specimen. — Arbor glabra. *Ramuli* 0.8—0.9 cm crassi, cum inflorescentiis petiolisque lenticellato-pustulati; medulla aresinosa, alabastro terminali fusco-furfuraceo. *Folia* $4\frac{1}{2}$-jugata usque ad 45 cm longa, petioli teretes basi vix deplanati, cum rhachidibus minute lenticellati, $7\frac{1}{2}$—9 cm longi, 0.4, basi inflata 0.8 cm diam., medulla 3—7 fasciculis vasorum resiniferis percursa; partes rhachidis interjugales 3—5 cm longae; foliola rigida, in sicco supra griseo-viridia, subtus brunnea, 9.5—19 × 4.5—7.5 cm, ovata ad oblonga, basi paulo inaequaliter rotundata vel late acuta, apice breviter obtuse acuminata, petioluli laterales 1—1.5, terminales c. 3 cm longi; costa media supra paulo, subtus cum nervis secundariis valde prominens; nervi secundarii utrimque 10—15, angulo 60°—70° de costa adscendentes, paulo curvati, prope margines plus minusve distincte arcuatim conjuncti; nervi tertiarii distanter transversi prope costam ea subperpendiculares, subtus conspicue prominentes, reticulatione minuta utrimque conspicua. *Inflorescentiae flores*que ignoti. *Infrutescentia* (unam tantum incompletam videmus) axillaris, a basi ramosa, rami solidi lenticellati, tota 7 cm longa; *fructus* immaturus (unum tantum videmus) *Haplolobi* typi 1.2 cm longus.

New Guinea. West New Guinea, Idenburg-river, 6 km SW of Bernhard Camp, frequent in primary forest, in valley, 1150 m alt.: *Brass & Versteegh 12546*, y. fr. in Febr. (A; L, *type specimen*), tree, 23 m high, 0.55 m in diam., bark brown, scaly, with some resin, sapwood white, heartwood red-brown, fr. green; same locality, 1170 m: *Brass & Versteegh 12544*, ster. (A, L), tree, 26 m high.

Remarks. The two specimens are doubtless conspecific. The

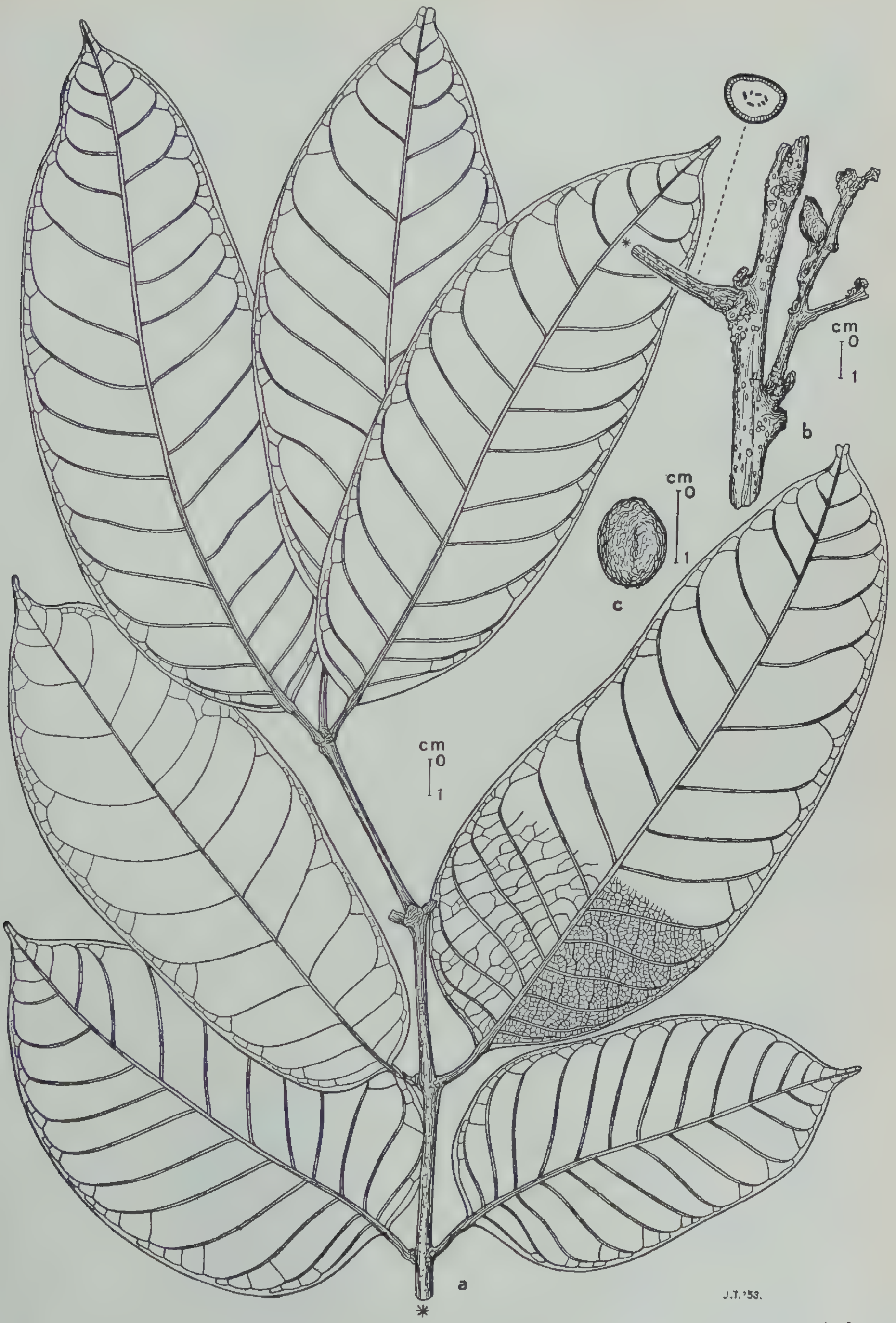
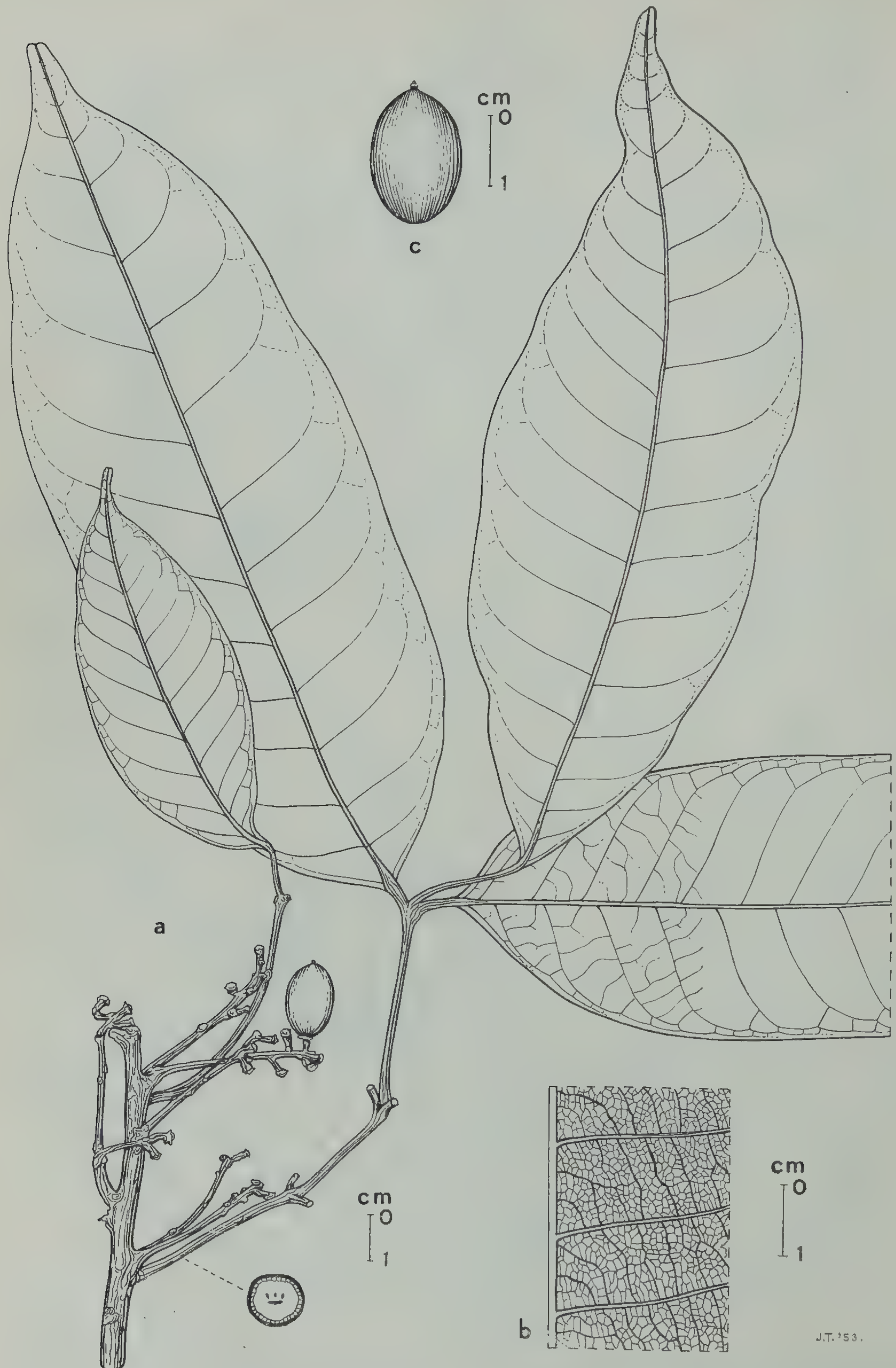


Fig. 9. — *H. versteeghii* H. J. Lam — a. leaf; b. branchlet with young infrutescences and cross section of petiole; c. fruit — from type specimen (*Brass & Versteegh 12546*, L).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relation seems to be with *H. floribundus*, but it is distinctly different by the coarsely prominent venation and the thick branchlets and strong petioles, even from the two mountain specimens known of that species.

Named in honour of Mr. Ch. Versteegh, the able Forestry Assistent, now of the Forestry Service at Hollandia, to whose scrutiny and careful methods we owe many excellent specimens.

13. H. hussonii H. J. Lam, nov. spec. — *Fig. 10.*

Description of type specimen. — Arbor (?) glabra. *Ramuli* teretes laeves 0.4—0.5 cm crassi, medulla aresinosa. *Folia* 2½(—3½)-jugata, 30—40 cm longa, glabra, petioli teretes, basi paulo deplanati 4—5 cm longi, 0.2—0.25 cm diam., medulla 3—6 fasciculis vasorum resiniferis percursa, partes interjugales rhachidis 2.5—4 cm longae; foliola tenuiter coriacea, i. s. griseo-brunnea vel livida, oblonga ad oblongo-lanceolata, basi subrotunda ad acuta, apice gradatim longiuscule obtuse acuminata, 10—22 × 4.5—8.5 cm, petioluli laterales 0.5—1.4, terminales 2.5—5 cm longi; costa cum nervis secundariis supra haud, subtus vix prominens, nervi secundarii utrimque 10—14, paulo conspicui, de costa angulo 60°—90° adscendentes, margines versus valde curvati, folioli medio et apice subdistincte arcuatim conjuncti; nervi tertiarii pergraciles distanter transversi, supra vix conspicui, medio folioli costa subparalleli, prope costam ea plus minusve perpendiculares, reticulatione inconspicua. *Inflorescentiae floresque* ignoti. *Infrutescentiae* graciles breves axillares, saepe basi ramosae, 2.5—5.5 cm longae, haud vel paulo lateraliter ramosae, pedicelli 0.2—0.4 cm longae, calycis rudimento 0.25 cm diam. *Fructus* haud nitidi oliviformes, 1.2—1.6 × 1—1.2 cm, cotyledones planae integrae.

NEW GUINEA. West New Guinea, Japen, Ansoes (Ansus): *Beccari P.P. 2224, 2224 A* (FI, *type spec.*), fr. in April; Seroei, 350 m alt.: *NIFS bb. 30515*, ster. (BO, L); ibidem, 370 m alt.: *NIFS bb. 30371*, ster. (BO, L) and *bb. 30462*, ster. (BO, L); Mamberamo area, "Pionierbivak", 30 m alt.: *NIFS bb. 31471*, ster. (BO, L).

Remarks. The sterile specimens quoted are tentatively inserted here on account of leaf shape and venation. The number of resiniferous ducts in the medulla of the petiole, however, is varying between 1 and 10. In *NIFS bb. 30515* it is 6, in *NIFS bb. 30371* it is 4, in *NIFS bb. 30462* it is 1 and in *NIFS bb. 31471* it is 10. In these sterile specimens the leaflets are mostly larger than in the type, viz. up to 30 × 8 cm in *NIFS bb. 30515*, 23 × 9 cm in *NIFS bb. 30371*, 26 × 8.5 in *NIFS bb. 30642* and 23 × 10 in *NIFS bb. 31471*. In the second and third specimen just mentioned the number of secundary nerves is up to 17, in the others it is conformable to that in the type.

Named in honour of the Rev. Fath. A. M. Husson S. C. J. who did all the often tedious and discouraging preparatory work for the present paper in a painstaking way.

14. H. megacarpus H. J. Lam, nov. spec. — *Fig. 11.* — Arbor glabra. *Ramuli* teretes laeves vel minute lenticellato-verrucosi, c. 0.4 cm

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Fig. 10. — *H. hussonii* H. J. Lam — a. branchlet with leaves, infrutescences and fruit, and cross section of petiole; b. part of leaflet showing venation; c. fruit — from type specimen (*Beccari P. P. 2224 A*, FI).

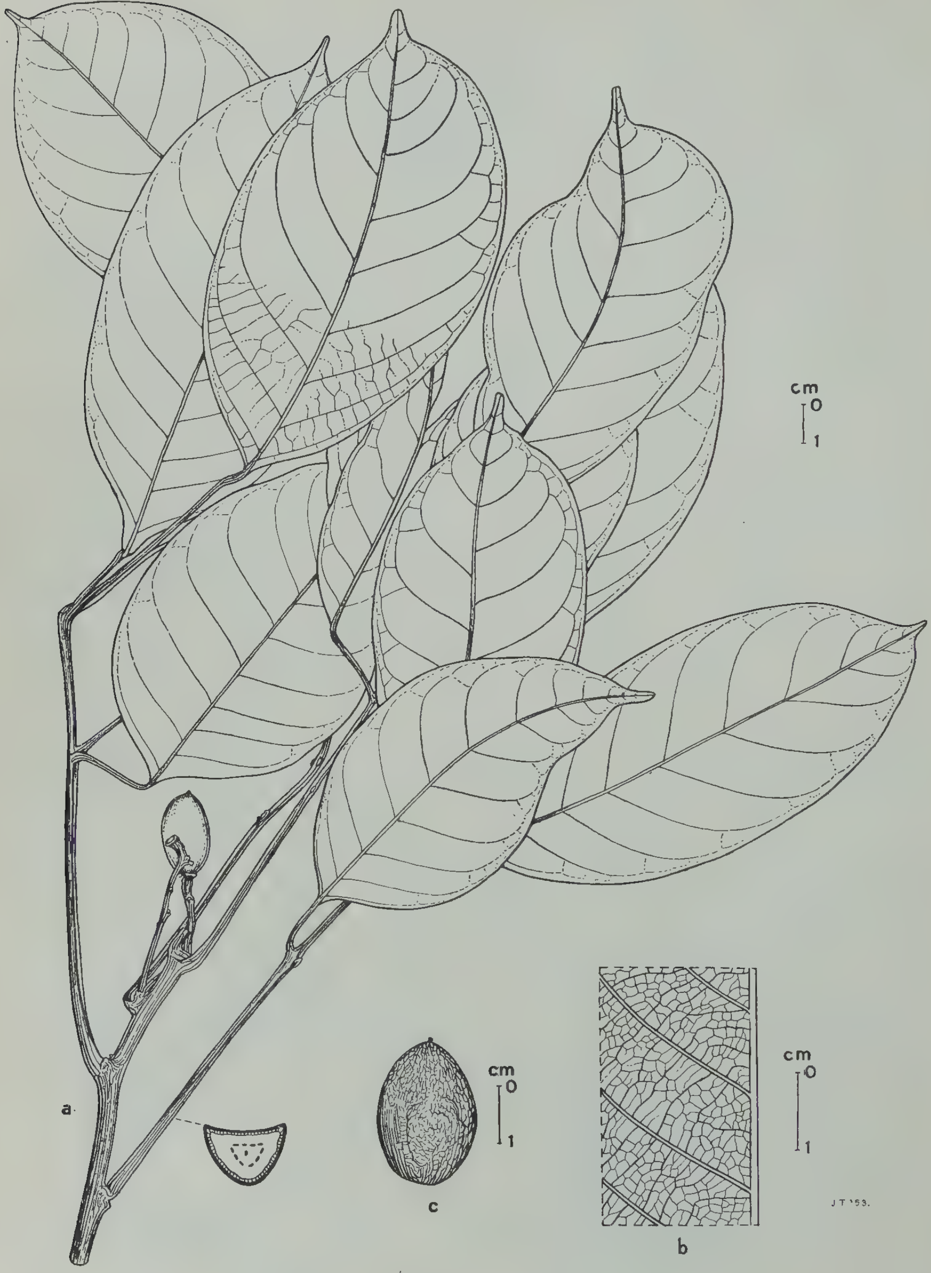

Fig. 11. — *H. megacarpus* H. J. Lam — a. branchlet with leaves, infrutescences and fruit, and cross section of petiole; b. part of leaflet showing venation; c. fruit — from type specimen (*Beccari PP 2225 A*, FI).

diam., medulla aresinosa. *Folia* 30—35 cm longa, (1½—)2½—3½-jugata, petioli 6—10 cm longi, supra distincte deplanati, 0.2—0.3, basi usque ad 0.5 cm crassi, medulla 5—12 fasciculis vasorum resiniferis percursa, rhachidis partes interjugales 3—5 cm longae; foliola ovata vel ovato-oblonga, i. s. brunnea, supra nitidula, subtus haud ita, basi plerumque late acuta saepe abrupte contracta, apice abrupte acuminata, (8.5—)10—13(—16.5) × 5—7 cm, acumine 0.5—1.4 cm longo; petioluli graciles, laterales 1.5—2, terminales 3—5 cm longi; costa cum nervis secundariis supra haud, subtus vix prominens, nervi secundarii utrimque 7—8, angulo 50°—60° de costa adscendentes, margines versus paulo curvati, haud arcuatim conjuncti; nervi tertiari transversi supra haud, subtus vix conspicui, reticulatione inconspicua. *Inflorescentiae flores*que ignoti. *Infrutescentiae* in foliorum ultimorum axillis insertae, breves, subrigidae 2.5—5 cm longae, saepe prope basin ramosae paucifructae; pedicelli crassi c. 0.5 cm longi, calycis rudimento 0.3 cm diam. *Fructus* pro genere magni oliviformes 2.3—2.8 × 1.3—1.8 cm, typi *Haplolobi*.

NEW GUINEA. West New Guinea, Japen, Ansoes (Ansus): *Beccari P.P. 2225, 2225 A, 2225 B* (FI, *type specimen*), fr. in April; tree, mature fruits like black olives, edible, nat. n.: au; same locality: *Beccari P.P. 2226* (FI), fr. only, same date.

Remarks. When dry the leaves have the undescribable colour, many *Meliaceae* show in the herbarium. Perhaps related to *H. leeifolius* which differs by the much smaller fruits and the less numerous resiniferous ducts in the petiole.

15. H. monophyllus H. J. Lam. nov. spec. — *Fig. 12.* — Arbor parva glabra. *Ramuli* graciles teretes laeves 0.2—0.4 cm diam., medulla aresinosa, gemmis vegetativis apiculatis furfuraceis. *Folia* ½—1½-jugata (i. e. 1-, 2-, vel 3-foliolata), bi- et unifoliolata ut apparet praesertim apices ramulorum versus; petioli (in foliis 2- vel 3-foliatis) 2.7—3.3 cm longi, medulla 1 fasciculo vasorum resinifero semi-orbiculari percursa; foliola coriacea, subrigida ovata, basi late acuta, saepe abrupte contracta articulata, apice gradatim vel subabrupte obtuse acuminata, 6—12.5 × 2.5—5.7 cm, petioluli laterales 1.5—1.7, terminales 2—3.5 cm longi, in foliis bifoliatis 1.5—2, in unifoliolatis 1.5—2.8 cm longi; costa media supra vix, subtus praecipue folioli basi conspicue prominens; nervi secundarii utrimque 6—9, angulo 65°—80° de costa adscendentes, supra haud subtus paulo prominentes, margines versus valde curvati et diminuti, interdum tenuiter arcuatim conjuncti, in eorum axillis distalibus fasciculos pilorum fuscorum (domatia) gerentes; nervi tertiarii transversi a reticulatione minuta densa utrimque praecipue subtus conspicua vix distinguendi. *Inflorescentiae* ♀ ignotae, ♂ in foliorum superiorum axillis insertae pergraciles, i. s. atrae, 0.7—5 cm longae, pauciflorae, breviter pedunculatae plerumque prope basin ramosae, interdum alabastro vegetativo abortivo suffultae, pedunculo rufo-furfuraceo, rami laterales usque ad 2 cm longi; bracteae minutae squamiformes. *Flores* parvi in siccitate c. 1 mm longi, 1.5 mm lati; *calyx* 3 lobis $^1/_2$—$^1/_3$ altitudinis metientibus latis deltoideis juvenalibus extus sparse pilosulis mox glabrescentibus; *petala* ovata 3 apice breviter reflexa paulo incrassata. *Stamina* 6 submonodynamia, antherae in alabastro ovarii rudimentum includentes, filamenta brevia disci minuti margine extus adnata.

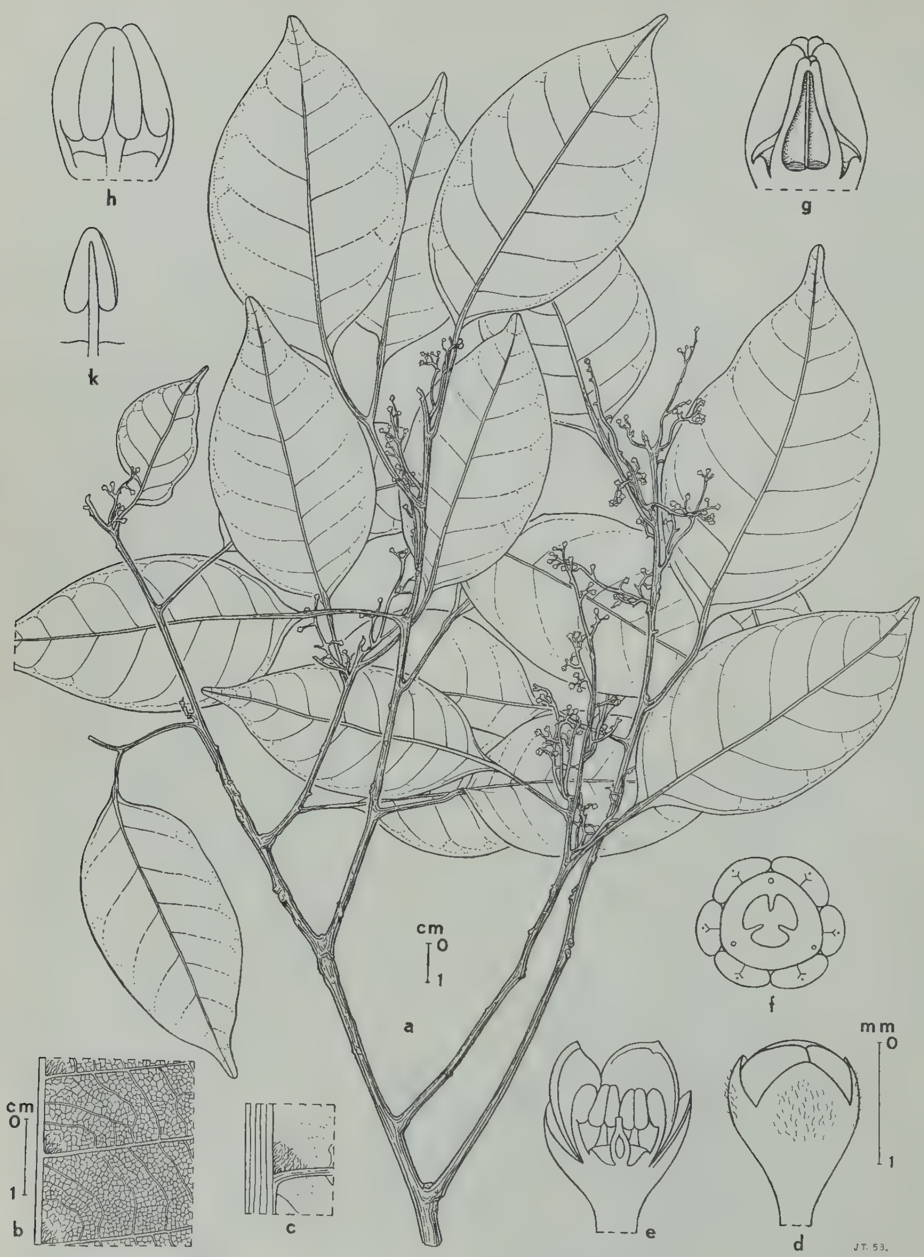

Fig. 12. — *H. monophyllus* H. J. Lam — a. branchlets with leaves and ♂ inflorescences; b. part of leaflet showing venation and domatia; c. domatium; d. ♂ flowerbud; e. adult ♂ flower, longitudinal section; f. cross section through young androeceum and sterile ovary with imperfect septa; g. ditto, longitudinal section; h. androeceum from outside; k. stamen from outside — a—c. from type dupl. (BO), d—k. from type specimen (*Main & Aden 1316*, L).

Ovarii rudimentum quam stamina adulta dimidio brevior, sterile, septis incompletis. *Infrutescentiae fructus*que ignoti.

MOLUCCAS. Morotai, G. Parepare, 1000 m alt.: *Main & Aden (Exp. Kostermans) 1316* (A, BISH, BG, BRI, CAL, K, LAE; L, *typ. spec.*; P, PNH), y. ♂ fl. in May, frequent tree, 10 m high, 0.2 m in diam., bark grey, flowers yellow, fruit (not seen) lilac.

Remarks. Fruits are, despite the fact that the specimen represents a male tree, mentioned on the field label. They have probably not been collected and if so, they probably do not belong to the specimen here cited.

A mountain species, remarkable for its in majority unifoliolate leaves with conspicuous "domatia" in most of the nerve axils, particularly in those near the base of the leaflets. On account of the very few-foliolate leaves, the dense reticulation, the single resiniferous duct in the medulla of the petiole and the short few-flowered inflorescences the present species is undoubtedly most closely allied with *H. nubigenus* from New Guinea. The very striking domatia link it both with the gland-bearing mountain species *H. glandulosus, monticola,* and *microphyllus,* and again with *H. nubigenus* which is sometimes provided with tiny glands.

16. H. nubigenus (Lauterb.) H. J. Lam 1932a, 208; id. 1932b, 415. — *Santiria nubigena* Lauterbach 1920, 335 — *S. triphylla* Lauterbach 1920, 336 — Iconography: Lam 1932a, fig. 61 (♀ flow.), and 1932b, pl. VIII, fig. 47 (hab. and ♀ infl., ♀ flow., y. fruit, and ♂ flow. bud).

NEW GUINEA. East New Guinea, Sepik area, 1000 m in alt., forest: *Ledermann 9989* (L, *neotype*), y. ♂ flow.; same locality, 2—400 m, forest: *Ledermann 9703* ♀ (L, *type dupl. Sant. triph.)*; same locality, 850 m alt.: *Ledermann 9565* (L), ster. — Papua, Boridi, c. 1500 m, forest: *Carr 13338* (BM, L), infr., tree c. 18 m high, buds yellow-green in Sept. (not found with the specimens).

Not examined (cf Lam 1932b): *Ledermann 10323* ♀ (Sepik area, *type* of *Sant. nubig.*).

Remarks. Endemic. The type specimen (*Ledermann 10323*) is probably lost, the only authentic specimen being *Ledermann 9989,* which, though included by Lauterbach with some doubt, is proposed here as a neotype. Though the above mentioned material is scanty and rather variable, it seems unwise to try and distinguish separate species. Common characters are the small and rigid leaflets, the solitary resiniferous duct in the medulla of the petiole, and the dense reticulation.

The variability involves particularly the number of leaflets and their shape. In the neotype the leaves are 1½—2½-jugate (the type description says: folia 2- vel 3-juga) and the leaflets are rather narrow (e.g. 8 × 2.5 cm). On the lower side there are occasionally one or two shallow pits which are probably nectaries, but they are not situated in the nerve axils as is the case in *H. glandulosus* and related species.

In the type specimen of *Sant. triphylla* the leaves bear 1—3 leaflets (½—1½-jugate), which are somewhat broader (viz. 9 × 3.5 cm) and show similar nectaries as are found in the neotype.

In the third Ledermann specimen spared (*Ledermann 9565*) there is only one (trifoliolate) leaf with broad leaflets (up to 8.5 × 4.5 cm) with some doubtful nectaries.

In the above-quoted specimens the bases of the leaflets are generally acute, in *Carr 13338* acute to rounded, and there are occasional minute

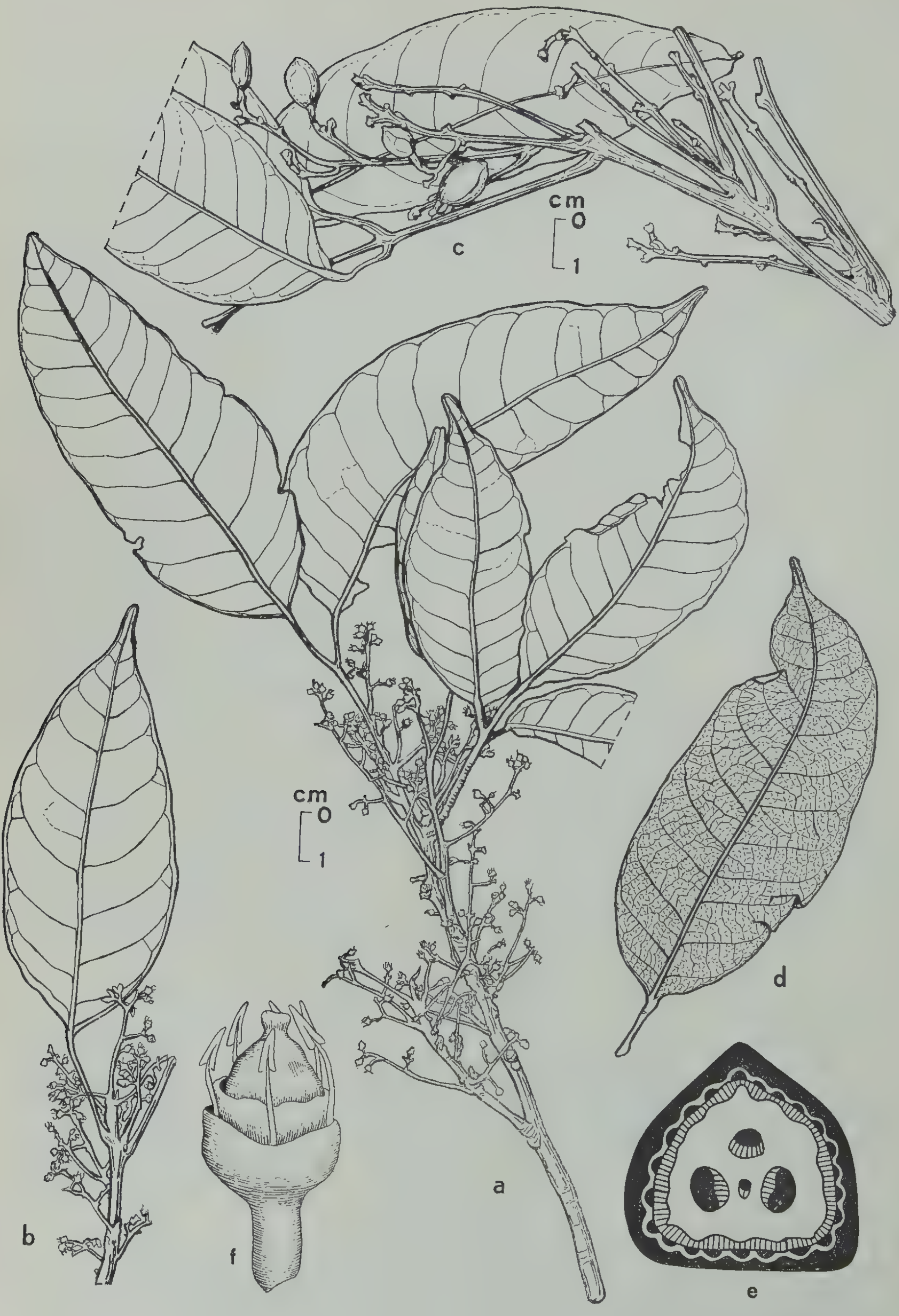

Fig. 13. — *H. clementium* A. M. Husson — a. branchlet with leaves and ♀ inflorescences; b. ditto, with unifoliolate leaf; c. ditto, with infrutescences; d. leaflet showing venation; e. cross section of petiole; f. ♀ flower — a, b, d—f. from type dupl. (*Clemens 1768*, A), c. from *Docters van Leeuwen 10800* (BO).

though unmistakeable glandular pits in the nerve axils which seem to make a transition to *H. glandulosus* c.s. (cf. Remarks under that species). The leaves are 1½—2½-jugate. Mature fruits are still unknown.

17. H. clementium A. M. Husson nov. spec. — *Fig. 13.*

Description of type specimen. — Arbor innovationibus exceptis glabra. *Ramuli* subgraciles, 0.3—0.5 cm diam., minute lenticellati, glabri, medulla compacta aresinosa. *Folia* ½—1½-jugata; petioli teretes basi plus minusve deplanati 1.8—4.5 cm longi, rhachidis partes interjugales c. 2 cm longae, medulla c. 5 fasciculis resiniferis percursa; foliola chartacea, oblongo-lanceolata basi late inaequaliter acuta, 7—12.5 cm longa, 2—5.3 cm lata, in sicco brunnea, apice subabrupte breviter obtuso-acuminata, acumine 5—7 mm longo, petioluli laterales 0.7—1.2, terminales 1.4—2.2 cm longi; nervi secundarii cum costa media utrimque conspicui sed paulo prominentes, 9—12, sub angulo ca 70°—80° a costa deviantes, margines folii versus curvati, nonnumquam prope marginem arcuatim conjuncti; nervi tertiarii cum reticulatione laxa conspicui transversi prope costam nonnulli ea perpendiculares, subtus distincte ad paulo conspicue prominentes. *Inflorescentiae* (♂ ignotae) ♀ breves paniculatae, multae in axillis foliorum plerumque caducorum, 2.5—4 cm longae plerumque a basi ramosae, nonnumquam gemmula terminali abortiva suffulta, cum calycibus dense minutissime pubescentes glabrescentes, bracteis perminutis munitae. *Flores* (♂ ignoti) ♀ 1—1.5 mm diam., pedicellis gracillimis glabris bracteolatis 1.5—2 mm longis. *Calyx* 3-fidus, 1 mm altus, sepalis late deltoideis obtusissimis brevibus. *Stamina* sterilia 6 univerticillata ovarium vix superantia, filamentis tenuibus glabris, antheris sagittatis acutis multo longioribus. *Discus* annularis glaber tenuis quam ovarium dimidio brevior. *Ovarium* 3-loculare, loculis 2-ovulatis. Cetera desunt.

NEW GUINEA. West New Guinea, Nassau range, "Explorateursbivak", in forest, 1000 m alt.: *Docters van Leeuwen 10800,* fr. reddish in Oct. (BO, L) — East New Guinea, Morobe District, Wareo, in forest, 750 m: *J. & M. S. Clemens 1768* ♀ (A, type dupl.; B, *type spec.*), tree, 30—60 cm in diam. breast high, flow. green white, fruit (not with the specimens examined) dull red in February.

Remarks. We have little or no doubt that *Docters van Leeuwen 10800* is conspecific with the type. The shape and nervation of the leaflets is identical, the difference being that the leaves are 1½—2½-jugate, the leaflets somewhat larger (8.7—17 × 3.5—6.5 cm), the number of resiniferous ducts 2—3, and that of secondary nerves 11—16. The infrutescences are, naturally, somewhat longer than the ♀ inflorescences, viz. 5—6 cm. The fruits are of the ordinary *Haplolobus*-type, more or less shining and black when dried, 1—1.5 × 0.7—1 cm, oblong and occasionally somewhat obliquely pointed with three small ribs, at the apex.

A mountain species characterised by its longish pointed leaflets and crowded short inflorescences (♀), named in honour of Chapl. J. and Mrs. M. S. Clemens, who enriched our herbaria with so many well-collected specimens both from New-Guinea and from elsewhere.

18. H. aneityensis (Guill.) A. M. Husson, nov. comb. — *Canarium aneityense* Guillaumin, Journ. Arn. Arb. 14, 1933, 54 — *Haplolobus salomonensis* C. T. White, Journ. Arn. Arb. 31, 1950, 92. — *Fig. 14.*

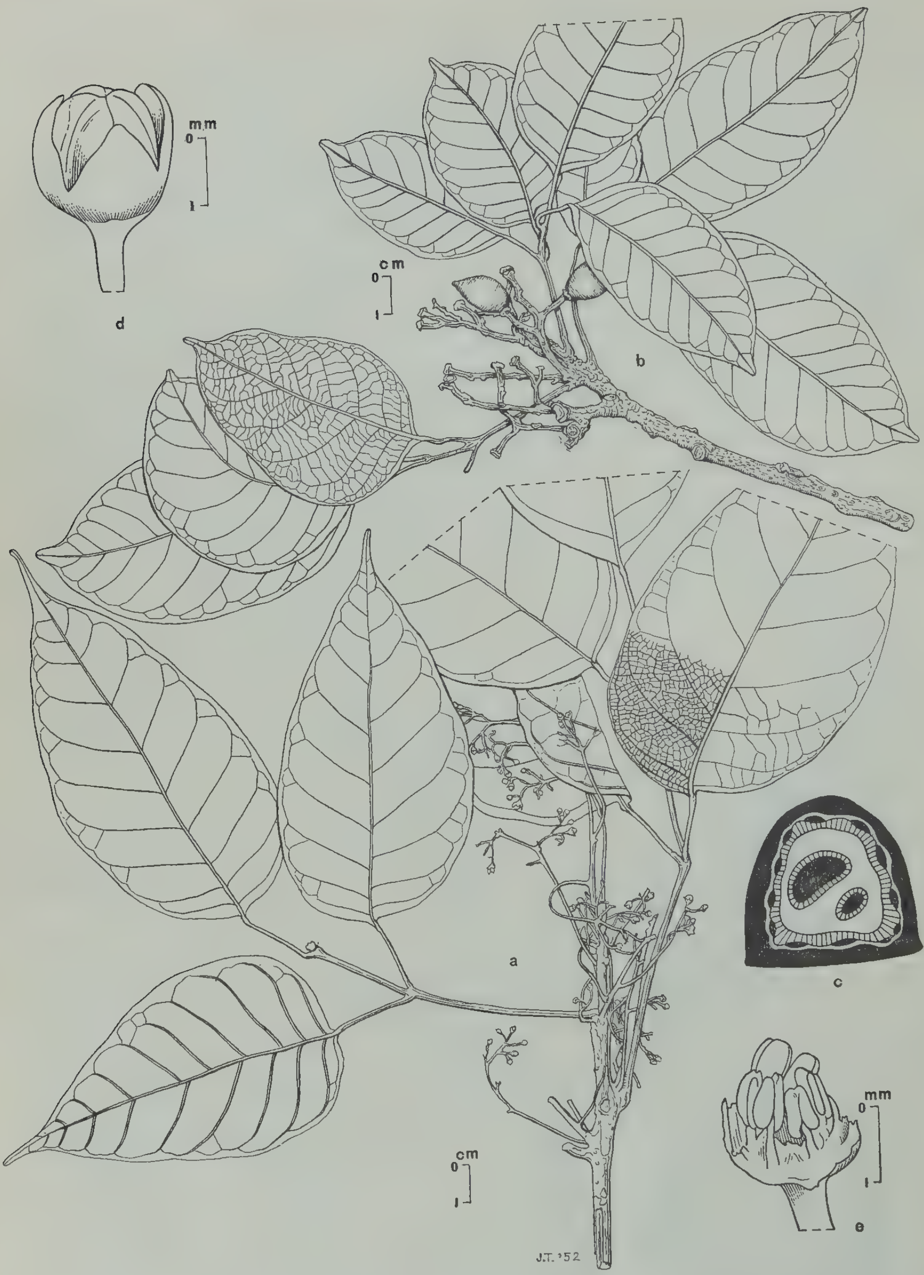

Fig. 14. — *H. aneityensis* (Guill.) A. M. Husson — a. branchlet with leaves and ♂ inflorescences; b. ditto, with infrutescences and fruits; c. cross section of petiole; d. ♂ flower; e. ditto, without corolla — a, c, d, e. from type spec. (*Kajewski 943*, A) b. from *A. C. Smith 6160* (A).

SOLOMON ISLANDS. Guadalcanal, Beaufort Bay, Kimbau riv., on ridge in rain forest, 200 m alt.: *F. S. Walker B.S.I.P. 242,* ♂ flow. (BRI, *type spec.* of *H. salom.*; L, type dupl.), tree with short buttresses, flow. green in Febr.

NEW HEBRIDES. Aneityum, Anelgauhat Bay, in rain forest, 150 m alt., common: *Kajewski 943,* ♂ flow. (A, *type spec.*; P), large tree, yielding a valuable cabinet wood, nat. n.: inyat, flow. green-white in March — Santa Cruz Group, Vanikoro, common in rain forest, 100 m alt.: *Kajewski 574,* ♂ (?) flow. (A), tree up to 20 m high, midrib yellowish-green underneath, flowers (insect-eaten) in Nov.

FIJI. Viti Levu, Mba, in dense forest along trail from Nadarivatu to Lewa, 750—850 m alt.: *A. C. Smith 6160,* fr. (A), tree, 20 m high, fr. in Sept.; same locality, dense forest between Nggaliwana and Tumbeindreketi Creeks, east of sawmill at Navai, 725—800 m alt.: *A. C. Smith 5858,* fr. (A), slender tree, 5 m high, "nggalinggawa" (nat. n. ?), fr. in Sept.; Rewa Province nr summit of Korombaba, 500 m in alt.: *Gillespie 2314,* ster. (BISH).

SAMOA. Savaii, above Sili, medium wet forest, 150 m alt.: *Christophersen 3279,* ster. (BISH, K), tree, 6 m high, bark very fragrant, nat. n.: a'a matie.

Remarks. All specimens quoted, though showing some variability, are perfectly conspecific with the type.

Apparently, *H. aneityensis* is a wide-spread tree in the Western Pacific; it is the only representative of the genus east of New Guinea (but for the doubtful New Britain specimen of *H. anisander*) and may generally be characterized as follows:

Leaves (1½—)2½—3½(—4½)-jugate, petioles slender, terete except at the very base, 2.5—9 cm long, with 1—5(—9) resiniferous ducts in the medulla; leaflets chartaceous, oblong to obovate with a broadly acute to rounded base and a more or less long and narrow blunt acumen (0.5—2 cm long), in some though not all cases very much like a leaf of certain *Populus* species ("populneus" would have been a very adequate specific name), (7—)10—15(—20) × (4.3—)6—8(—9) cm, with slender, transverse tertiary nerves and a faint and lax reticulation, secondary nerves 6—10; petiolules long and slender, articulate under the leaflets, lateral ones (1—)1.7—2.7(—3.7), terminal ones (1.3—)3.5—5(—7) cm long. *Inflorescences* (♂) axillary, lax, broadly ramified mostly from the base, black when dried, 5—16 cm long, ♀ ones unknown; *infrutescences* axillary, little branched, stiff, 1—7 cm long, pedicels 0.7—1 cm long, calyx 0.25—0.3 cm in diam., fruits ovoid, rounded at base, more or less acutely pointed at apex, 1.5—2.1 × 0.7—1.1 cm. Female flowers are so far unknown.

Individual differences may be inferred from the following annotations (r. d. = number of resiniferous ducts in the medulla of the petiole):

The male specimens quoted show little variability except that the leaflets are now more poplar-like (*Walker 242,* r. d.: 1; *Kajewski 943,* r. d.: 2—3), now more oblong (*Kajewski 574;* r. d.: 5), but the two types are often found on the same branch and even on the same leaf, the terminal leaflet being mostly more oblong, but lateral ones may be so as well. In the fruiting specimen *A. C. Smith 6160* the leaflets are of both types, the leaves being rather smaller than in the male plants, r. d. 4—9; the infrutescences are 1—3 cm long. In the fruiting specimen *A. C. Smith 5858,* however, the leaves are large, 3½—4½-jugate, with large oblong leaflets (up to 13.5 × 6 cm) and long petiolules (up to 3.7 cm), r. d. 5, infrutescences up to 7 cm, the fruits being similar with those of *A. C. Smith 6160.*

Even larger leaves of the same type has the sterile *Christophersen*

3279: leaflets thin, up to 19 × 8.5 cm, petiolule 3 cm, r. d. 2—3. In *Gillespie 2314* (r. d.: 3) they are smaller and oblong-obovate.

As Christophersen states (B. P. Bish. Mus. Bull. 128, 1935, p. 113, Flow. Pl. of Samoa) there are, in his *n. 3279*, occasionally little hair tufts in the nerve axils underneath as are found in *H. monophyllus* and occasionally in *H. anisander*. For the rest the specimen is exactly like *A. S. Smith 6160.*

In view of the native name used by Yuncker (Plants of the Manua Islands, Bernice P. Bishop Museum Bull. 184, 1945, 44) for a *Canarium* species occurring in Tau Island, American (Eastern) Samoa, it is possible that this is identical with *Christophersen 3279* and equally belongs to *H. aneityensis.*

H. aneityensis seems most related to *H. floribundus* (cf. *Clemens 846* under the last-named species).

19. **H. borneensis** H. J. Lam, 1932b, 418. — Iconography: Lam l. c. pl. XIV, fig. 93 (branchlets with ♂ infl., cross sect. of branchl. and pet., ♂ flow.).

BORNEO. North Borneo, Mt Kinabalu, Tenompok, 1500 m: *J. & M. S. Clemens 29338,* ♂ flow. (L, *type spec.*; BM), tree, 12 m high, flow. cream green with purple tinge, in Apr.; same locality: *J. & M. S. Clemens 29338 A* (L), young (♂ ?) flow. greenish white, in Apr.; Gurulau Spur, 1500 m: *J. & M. S. Clemens 50563,* ♂ flow. (BM), tree, flow. cream green, anthers golden, in Dec.; same locality: *J. & M. S. Clemens 50441,* ♂ flow. (BM), tree, 24 m high, flow. cream green, lemon anthers, in Nov.; Penibukan ridge, 1500 m: *J. & M. S. Clemens 50242,* ♂ flow. (B, BM, L), tree, 27 m high, 0.9—1.2 m in diam., flow. cream green, in Nov.

Remarks. Female flowers and fruits are still unknown. A mountain species, only known from Mt. Kinabalu, characterized by its small and narrow leaflets which are acute at base and acuminate at apex (3.5—13 × 1.3—5.3 cm), with 7—10 secondary nerves and 1—5 resiniferous ducts in the medulla of the petioles; and by its axillary, often large and widely branched ♂ inflorescences (6—18 cm long), with fairly large flowers for the genus (2—2.5 mm in diam.).

Its relation seems to be with Papuan species, rather than with the second Borneo species (*H. beccarii*), but it is difficult to state which Papuan species is nearest. The ♂ inflorescences resemble those of *H. floribundus* but the leaves are quite differently shaped, and the reticulation is more lax.

20. **H. anisander** (Lauterb.) H. J. Lam 1932a, 207; id. 1932b, 414. — *Santiria anisandra* Lauterbach 1920, 339 — Iconography: Lauterbach 1920, fig. 4, sub *Sant. anis.* (branchl. with leaves and ♂ infl., ♂ flow.; infl. are too heavy, androeceum of ♂ flow. is not correct, cf. Lam 1932b; same fig. in Engl. & Prantl, Nat. Pfl. Fam. 2nd Ed. 19a, 1931, 454, fig. 218); Lam 1932b, pl. VIII, fig. 46 (leafl. with venation, ♂ flow.).

Note. Unfortunately the specific epithet refers to an incorrect observation. In fact, the androeceum, like in all other species of the genus, is monodynamous, at least in adult flowers, and all stamens are inserted outside the fleshy disk.

MOLUCCAS. Banggai, Pongian, 85 m alt.: *NIFS bb. 31878*, ster. (BO, L) — Halmaheira, Weda, Tilope, 25 m alt.: *NIFS bb. 24882*, ♀ flow. (BO, L), in May; same locality, frequent in old forest on limestone: *NIFS bb. 24852*, ♂ flow. (BO, L), in April, tree, 26 m high, 0.37 m in diam., flow. yellow, with sweet taste; Weda, Luku Lamo, 10 m in alt.: *NIFS bb. 24939*, ster. (BO, L) — Morotai, G. Parepare, 1000 m in alt.: *Main & Aden (Exp. Kostermans) 1253*, ♂ flow. (BO, L), tree 5 m high, flow. white, in May — Batjan, alt. 15 m: *FRI bb. 16456*, ster. (BO, L), part of leaf only — Buru, Kak Tua forest: *NIFS bb. 22832*, ster. (BO, L) — Ceram, Kiandarat, 60 m alt.: *NIFS bb. 25878* and *25841*, both ster. (BO, L); same locality, Kiandarat, Rumaga, 60 m alt., fairly frequent in old forest on slope: *NIFS bb. 25925* (= *Buwalda 580*), ster. (BO), tree, nat. n.: lawai.

NEW GUINEA. West New Guinea, Meosnoem, 200 m in alt.: *NIFS bb. 30973*, ♂ flow. (BO, L), in Oct.; Biak: *NIFS bb. 30824*, ster. (A, BO, L); Japen, 700 m in alt.: *NIFS bb. 30306*, ster. (A, BO, L) — East New Guinea, Sepik area, "Schichtberg", 400 m in alt.: *Ledermann 7719*, ♂ flow. (K, *lectotype*), flow. in July; same locality, 3—400 m: *Ledermann 7483*, ♂ (K).

NEW BRITAIN. Jacquinot Bay: *NGF 162*, ster. (LAE, L), tree, 27 m high, 0.38 m diam., flanges to 0.9 m, bark light and mottled, smooth, yellow and brown inside.

Remarks. As the type has evidently got lost, it is proposed to select the Kew duplicate of *Ledermann 7719* as the lectotype.

As has been stated elsewhere (cf. Remarks to *H. moluccanus, floribundus*, and *celebicus*) the specific limits towards the three species just mentioned are indistinguishable in some sterile specimens. The difficulty is increased by the fact that the areas as accepted in the present paper, are overlapping, even though an attempt has been made to make taxonomical and geographical border lines correlate. This is, for instance, why the Moluccan specimens of *H. celebicus* — all sterile — have been inserted in that species with doubt.

In drawing the limits to *H. anisander* the following remarks may be useful (r. d. = resiniferous ducts):

H. anisander is characterized by (½—1½—)2½(—3½)-jugate leaves with slender petioles with 1—4(—5) r. d., thin leaflets with acute bases and acuminate tips, 8—12 secondary nerves and a little conspicuous, rather lax reticulation, gracile and rather long petiolules and very slender and short, axillary inflorescences, male ones more slender than female ones, both mostly branched from the base, ♀ (only one known) 4.5 cm long, ♂ 1.5—8 cm long. Infrutescences and fruits are thusfar unknown.

The leaflets are mostly rather small e. g. in the lectotype 8—11 × 2.5—3.5 cm, with petiolules of 0.8—1.2 cm (lat.), in several other specimens little larger (particularly the terminal one, e. g. in *NIFS bb. 31878* up to 14 × 6.3 cm, petiolules 0.8—1.5 (lat.) and 3—4.5 cm (term.). Larger leaflets, however, are found in specifically undubitable specimens, such as *NIFS bb. 24882*, which bears female inflorescences and has leaflets up to 20 × 8 cm with petiolules up to 2 cm (lat.). This renders identification of sterile specimens almost impossible. In *NIFS bb. 24939* (r. d.: 4) and *16456* (r. d.: 2—3), for instance, the leaflets are very much the same as those of the smaller types of *H. celebicus* (r. d.: [1—]4—9) and the insertion in one or the other species is rather arbitrary (cf. the case of *NIFS bb. 31850* mentioned under *H. celebicus*). Like in that case the choice has been based mainly on the evidence of the locality, once it had, for safety's sake, been decided that indubitable *celebicus* is thusfar only known from Celebes proper.

On the other hand, the cases of *NIFS bb. 24939* and *16456* are supported by *Main & Aden 1253* (r. d.: 2—3) which has similar leaflets in connection with tell-tale ♂ inflorescences. The last-named specimen is of further interest since in one of the Leiden sheets the (sole) leaf is unusually large (petiole 9 cm, r. d. 3, leaflets 20.5 × 8.3 cm, petiolules lat. 3.5, term. 6.5 cm); in the other sheet of the same number the size is of the ordinary smaller type. As additional evidence, *NIFS bb. 22832* has leaflets of various sizes on the same branchlet, and others, such as *NIFS bb. 25878, 25841,* and *25925* have intermediate sizes (all with 2—4 r. d.).

Typical thin-leaved specimens, exactly tallying with the lectotype are known from widely separated localities such as Banggai (close to the Celebes mainland: *NIFS bb. 31878,* ster.; in most Moluccan flowering specimens the leaflets are rather approaching the intermediate size), Meosnoem (New Guinea, Geelvink Bay: *NIFS bb. 30973,* ♂) and the Sepik area (*lectotype,* ♂).

On the other hand, intermediate-sized leaflets are by no means restricted to the Moluccan area, as is shown by *NIFS bb. 30973* and some of the Biak specimens. In addition, the latter seem to show some affinity to *H. floribundus* by their thicker and more rigid leaflets, whose shape, however, is that of *H. anisander.*

A noteworthy feature of *Main & Aden 1253* is that in some nerves of some leaflets small "domatia" are found of the type which is found in some other species (*H. aneityensis, H. monophyllus*).

More or less doubtful is the New Britain specimen (*NGF 162*) with some 4½-jugate leaves with narrow, (when dry) black leaflets (usually greenish) and 1—3 r. d.

21. H. leeifolius (Lauterb.) H. J. Lam 1932a, 208; id. 1932b, 417. — *Santiria leeaefolia* Lauterbach 1920, 335 — Iconography: Lam, l. c. pl. VIII, fig. 50 (leafl., ♂ infl. and flow.); the present paper, *Fig. 15.*

NEW GUINEA. West New Guinea, Arfak Mts, Poetat (Putat): *Beccari P.P. 862* (= *Herb. Fir. 2222*), fr. (FI), in Oct.; same locality: *Beccari P.P. 918* (= *Herb. Fir. 2221*), y. (prob. ♂) flow. (FI), in Oct. — East New Guinea, Sepik area, April riv., 2—400 m: *Ledermann 9760,* ster. (L, type dupl. of *Sant. leeaef., lectotype*).

Remarks: Endemic. As the type specimen has probably been destroyed, it is proposed to consider the only type duplicate left the lectotype. The type specimen bore ♂ flowers but unfortunately the only type duplicate is sterile.

The two Beccari specimens seem perfectly conspecific with the lectotype. In the latter, however, the colour of the dried leaflets is greyish (leaves 2½-jugate, t. Ledermann), in the Beccari specimens it is light brown (leaves 2½—3½-jugate).

H. leeifolius is characterized by terete and slender branchlets, 0.2—0.4 cm in diam. and more or less striate. The whole plant is glabrous except the young parts which are pulverulent to pilose. The leaves are 2½—3½-jugate, petioles (with 1—5 resiniferous ducts) 3—3.5 cm long, leaflets chartaceous, rather thin, ovate with acute base and long, narrowly

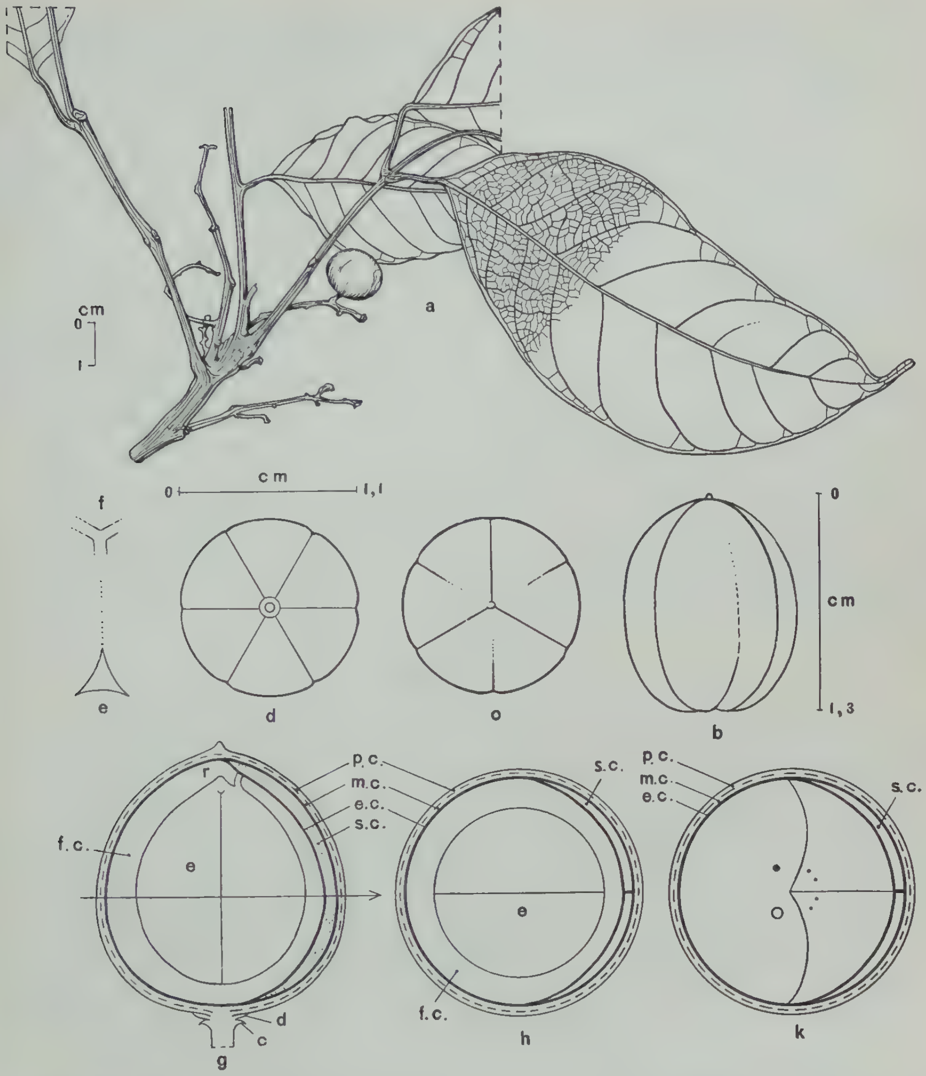

Fig. 15. — *H. leeifolius* (Lauterb.) H. J. Lam — a. branchlet with leaves, infrutescences and fruit; b. fruit, lateral view; c. ditto, from above; d. ditto, from below; e. basal configuration of putamen; f. apical ditto; g. longitudinal section of fruit and embryo; h. cross section of same; k. ditto, the embryo removed, showing the scars of the funicula on the endocarp (legenda to g—k: f. c. fertile cell, s. c. sterile cells, e. embryo, r. radicle, p. c. pericarp, m. c. mesocarp, e. c. endocarp, d. disk, c. calyx) — from *Beccari P.P. 862* (FI).

and bluntly acuminate apex, 7—15.5 × 3.5—7 cm, petiolules 0.8—1.8 cm (lateral) and 3.5—4 cm (terminal), secondary nerves 8—12, little prominent below, hardly so above, tertiary nerves and reticulation faint and little conspicuous on either side. Female inflorescences and flowers unknown, ♂ inflorescences axillary, 4—8 cm long, often branched from the base and sometimes with an obsolete vegetative bud near it (cf *H. monophyllus* and *H. floribundus*). Infrutescences (*Beccari 862*) slender, 2—4 cm long, entirely conformable with the ♂ inflorescences, pedicels 0.2—0.3 cm long, the permanent calyx 0.15—0.2 cm in diam. Fruits globular, 1.1—1.3 cm in diam., pericarp smooth, with 6 faint grooves from the base, 3 of which may reach the apex, putamen with 3 shallow and short ribs near base and apex, there forming a regular figure of 3 meeting lines. The single seed is attached near the apex of its cell (cf. *Fig. 15*). Female inflorescences and flowers are still unknown.

Beccari 918 has young, still very small inflorescences (1.2—2 cm) of undefinable sex. The annotation in Beccari's handwriting accompanying this specimen is worth while mentioning. It reads: "I fiori giovanissimi mostrano distintam^{e} un calice 3-partito, lobi valvati, corolla 3 petali valvati, stami 6, disco largo concavo. I fiori sono perfett^{e} quelli di una Santiria, ma diff. il frutto che ha stilo term^{e} e cotiled^{o} piano convessi. Intermedio fra Santiria ed Hedwigia? Gen. nov.?"

This clever observation perfectly matches that made on a specimen of *H. acuminatus* (see there). Unless there has been a commutation of field labels, the above quotation might mean that the specimen represents a female plant, but it seems to us that the annotation cited belongs to *Beccari 862* rather than *918*.

Collectors' numbers.

Numbers are those of the species in the text. For abbreviations, see p. 423; t = type specimen; nt = neotype; lt = lectotype; f = figure only; ne = not examined (untraceable or lost).

Beccari PP 542 (= Herb. Fir. 2220—2220 A) (5), PP 862 (Herb. Fir. 2222) (21), PP 876 (= Herb. Fir. 2223—2223 A—2223 B) (5), PP 918 (Herb. Fir. 2221) (21), PB 1803 (= Herb. Fir. 2217—2217 A) (7 t), PP 2224—2224 A (13 t), PP 2225—2225 A—2225 B (14 t), PP 2226 (14); Beguin 1902 (8 ne), 2225 (8 t), 2301 (8); Boden Kloss s.n. (5 ne); Brass 685 (5), 13152 (3); Brass & Versteegh 11198 (1 t), 12544 (12), 12546 (12 t), 13111 (6 t); Buwalda, v. NIFS.

Carr 12247 (11), 13338 (16); Christophersen 3279 (18); Clemens 846 (11), 1752 (11), 1768 (17 t), 1924 (3 t), 4941a (2), 4988 (2 t), 29338 (19 t), 29338 A (19), 50242 (19), 50441 (19), 50563 (19).

Docters van Leeuwen 10655 (ne), 10765 (ne), 10800 (17), 11186 (ne).

FRI, v. NIFS; FRI Cel/V—208 (9 t), Cel/V—312 (9).

Gillespie 2314 (18).

Hatusima, v. Kanehira; Hollrung 543 (11 lt), 737 (5 lt).

Kajewski 574 (18), 943 (18 t); Kanehira & Hatusima 11522 (10); Kostermans, v. NIFS, and Main & Aden.

Lam 705 (5), 3550 (8), 3583 (8), 3653 (8); Ledermann 6548 (10 f), 6605 (10 ne), 7397 (11 ne), 7483 (20), 7507 (11 ne), 7706 (11 ne), 7719 (20 nt), 7794 (10 ne), 7804 (10 f), 7806 (5 ne), 8041 (11 ne), 8082 (10 f), 8612 (10 ne), 9013 (4 lt), 9565 (16 ne), 9691 (10 f), 9703 (16), 9724 (5), 9760 (21 lt), 9796 (11), 9877 (4), 9915 (4), 9989 (16 nt), 10323 (16 ne), 10390 (5), 10393 (5 ne), 10396 (10 ne), 10398 (11 ne), 10455 (11), 10646 (11 ne), 10708 (10 ne), 11484 (4 ne), 11548 (5 ne), 12249 (11 ne), 12442a (4 ne), 12506a (4 ne).

Main & Aden (Exp. Kostermans) 1253 (20), 1316 (15 t), 1417 (9).

NGF 162 (20), 925 (11), 1312 (11), 1564 (11), 3754 (5); NIFS (bb. numbers) 14536 (11), 15892 (11 ne), 16456 (20), 22832 (20), 23153 (8), 23182 (9), 24500 (9), 24847 (8), 24852 (20), 24882 (20), 24939 (20), 25015 (11), 25088 (11), 25095 (11),

25841 (20), 25878 (20), 25925 (= Buwalda 580) (20), 28840 (9), 28871 (9), 28970 (11), 30306 (20), 30371 (15), 30462 (13), 30470 (5), 30515 (13), 30692 (11), 30694 (11), 30722 (11), 30764 (11), 30777 (11), 30824 (20), 30840 (11), 30973 (20), 31079 (11), 31471 (13), 31850 (9), 31878 (20), 31901 (9), 32598 (9), 32604 (9), 33437 (11), 33468 (11), 33782 (= Kostermans 88) (8).
A. C. Smith 5858 (18), 6160 (18).
Versteegh, v. Brass.
Walker B.S.I.P. 242 (18).

Index to scientific names.

Accepted species in roman, synonyms in italics. New species are denoted by an asterisk. The numbers refer to those of the species in the text. Fig. means figure.

Canarium *aneityense* Guill. (18)
— *furfuraceum* Lauterb. (11)
— *pachypodum* Lauterb. (5)
Haplolobus (*Fig. 1*, map)
— acuminatus (K. Schum.) H. J. Lam (5, *Fig. 5*)
— aneityensis (Guill.) A. M. Husson (18, *Fig. 14*)
— anisander (Lauterb.) H. J. Lam (20)
— *beccarii A. M. Husson (7, *Fig. 7*)
— borneensis H. J. Lam (19)
— celebicus H. J. Lam (9)
— *clementium A. M. Husson (17, *Fig. 13*)
— floribundus (K. Schum.) H. J. Lam (11)
— *furfuraceus* (Lauterb.) H. J. Lam (11)
— *glandulosus A. M. Husson (2, *Fig. 3*)
— *hussonii H. J. Lam (13, *Fig. 10*)
— ledermannii (Lauterb.) H. J. Lam (4)
— leeifolius (Lauterb.) H. J. Lam (21, *Fig. 15*)
— maluensis (Lauterb.) H. J. Lam (10, *Fig. 8*)
— *megacarpus H. J. Lam (14, *Fig. 11*)
— *microphyllus A. M. Husson (1, *Fig. 2*)
— moluccanus H. J. Lam (8)
— *monophyllus H. J. Lam (15, *Fig. 12*)
— *monticola A. M. Husson (3, *Fig. 4*)
— nubigenus (Lauterb.) H. J .Lam (16)
— *pachypodus* (Lauterb.) H. J. Lam (5)
— *robustus H. J. Lam (6, *Fig. 6*)
— *salomonensis* C. T. White (18)
— *sepikensis* (Lauterb.) H. J. Lam (11)
— *versteeghii H. J. Lam (12, *Fig. 9*)
Santiria *acuminata* K. Schum. (5)
— *anisandra* Lauterb. (20)
— *caudata* Lauterb. (4)
— *floribunda* K. Schum. (11)
— *ledermanni* Lauterb. (4)
— *leeaefolia* Lauterb. (21)
— *maluensis* Lauterb. (10)
— *nubigena* Lauterb. (16)
— *sepikensis* Lauterb. (11)
— *triphylla* Lauterb. (16)

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REVISION OF THE BURSERACEAE OF THE MALAYSIAN AREA IN A WIDER SENSE

VI [1]. Revision of the genus Garuga Roxburgh

by

C. KALKMAN

(Rijksherbarium, Leiden)

(Issued 18. XII. 1953)

In the Malaysian area proper this small genus is represented by one species only (*G. floribunda*), but it seemed preferable to extend this work to a revision of the whole genus.

The species of this genus are not easily distinguishable when sterile and the identification of such specimens is all too often made on geographical evidence.

At our disposal was material from the herbaria of Bogor, Calcutta, Edinburgh, Florence, Geneva, Honolulu (Bern. P. Bish. Mus.), Jamaica Plain (Arnold Arb.), Kepong, Kew, Leiden, London (Brit. Mus.), Melbourne, New York (Bot. Gard.) and Paris.

Except for the original litterature in this revision only those references are given, which are not mentioned in Lam's revision of the Malaysian Burseraceae, Bull. Jard. Bot. Buitenz., Sér. 3. 12, 1932, 325—331. The material of *G. floribunda* investigated is also cited only as far as not mentioned by Lam, l. c.

Unless the presence of flowers or fruits is mentioned, the specimens quoted are sterile; months of flowering and fruiting are designated by roman numerals. The abbreviations of the herbaria are those of the "Index Herbariorum" (1952).

GARUGA Roxburgh, Hort. Beng. 1814, 33; Spach, Hist. nat. vég. 2, 1834, 245; Wight & Arnott, Prodr. Fl. Penins. Ind. Or. 1, 1834, 175; Endlicher, Gen. plant. 1839, 1137; Walpers, Ann. bot. syst. 3, 1853, 843 and 7, 1868, 546; Bentham & v. Müller, Fl. Austr. 1, 1863, 377; Drury, Handb. Ind. Fl. 1, 1864, 249; Marchand, Adansonia 7, 1867, 301 & 369; Brandis, For. Fl. N. W. & Centr. Ind. 1874, 62; Cooke, Fl. Pres. Bombay 1. 1903, 199; Duthie, Fl. Upp. Gang. Plain 1, 1, 1903, 148; Lam, Bull. Jard. Bot. Buitenz. Sér. 3, 12, 1932, 325—331. — *Capraria* Rumphius, Herb. Amb. 2, 1741, 139. — *Kunthia* Dennstedt, Schl. z. Hort. Ind. Malab. 1818, 30 (non *Kunthia* Humb. & Bonpl.). — *Fig. 1.*

Type species: *Garuga pinnata* Roxburgh.

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[1] I—IV in Blumea VII, 1, 1952, 154—170; V, this issue, p. 413—458.

Distribution: Continental South East Asia, Northern and Eastern Malaysia, Northern Australia, Western Pacific.

Shrubs or trees. Branchlets without resiniferous ducts in medulla. *Leaves* pinnate, stipulate and with gradual transitions from stipules to normal leaflets (stipules not seen in *G. forrestii*); petioles without or with some resiniferous ducts in medulla; leaflets ovate to oblong, sessile or petioluled, margin crenate-serrate, stipellae often present. *Inflorescences* axillary or lateral, conferted at tips of branchlets, appearing before leaves, tomentose, bracts deciduous. *Flowers* bisexual. Receptacle globose or cupular, woolly tomentose as are sepals and petals. *Sepals* 5, free, deltoid to subulate. *Petals* 5, free, ovate to lanceolate. *Stamens* 10, free, inserted at margin of receptacle, usually more or less didynamous, anthers dorsifix, filaments usually tomentose at base. *Disc* adnate to receptacle, glabrous, with 10 nectarial lobes between stamens. *Ovary* on short gynophore, 5-celled, style cylindrical, stigma 5-lobed. *Fruits* drupaceous, 1—5-seeded, pericarp carnose, pyrenes small, gibbous, bony, thick, cotyledons compound, contortuplicate in the seed.

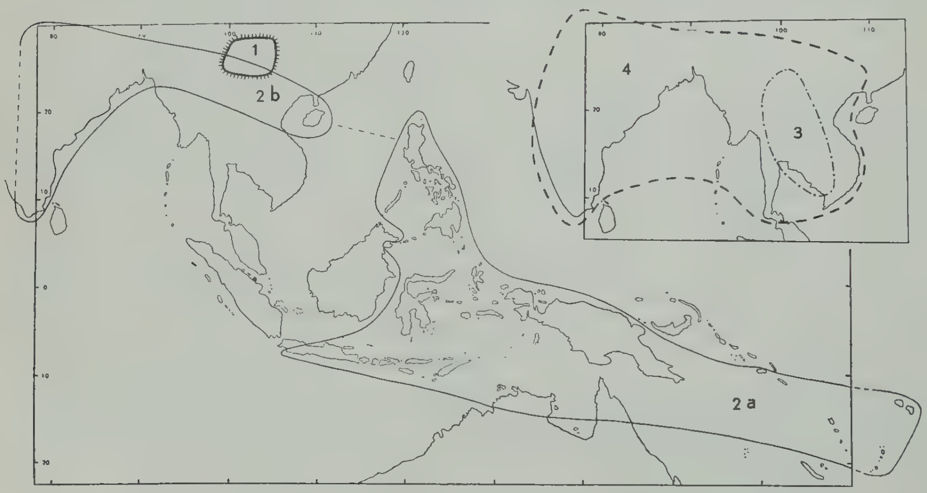

Fig. 1 — Distribution of *Garuga*-species — 1. *G. forrestii*; 2. *G. floribunda*, a. var. *floribunda*, b. var. *gamblei*; 3. *G. pierrei*; 4. *G. pinnata*.

Key to the species and varieties.

1a. Flowers 0.3—0.6 cm long; fruits 0.5—1 cm long, 0.5—1.2 cm in diam. . . . 2
b. Flowers 0.6—0.8(—1) cm long; fruits 1—2.3 cm long, (0.9—)1.1—1.8 cm in diam. 4
2a. Inflorescences densely erect tomentose; flowers 0.3 cm long: infrutescences with many filiform sterile pedicels; fruits more or less trigonous in cross-section; petioles without resiniferous ducts in medulla. — *West China* **1. G. forrestii** Smith
b. Inflorescences pubescent to glabrous; flowers (0.35—)0.4—0.6 cm long; fruits more or less circular in cross-section; medulla of petioles with usually two, rarely without or with one or more than two resiniferous ducts 3

3a. Inflorescences (11—)18—37 cm long, peduncle (6.5—)9—14 cm long. — *Continental S.E. Asia, incl. Hainan*
2. **G. floribunda** Decaisne var. **gamblei** (King ex Smith) Kalkman

b. Inflorescences 4—21(—30) cm long, peduncle 0.5—9 cm long. — *Philippines, N. Borneo, Celebes, Mid and East Java, to Samoa and Tonga, also N. Australia*
2. **G. floribunda** Decaisne var. **floribunda**

4a. Receptacle globose; stipellae extant or wanting; medulla of petioles without or with two resiniferous ducts. — *Yunnan, Thailand, Cambodja*
3. **G. pierrei** Guillaumin

b. Receptacle cylindrical; stipellae wanting; medulla of petioles without resiniferous ducts. — *India (not in Ceylon), Sikkim, East Pakistan, Burma, South China, Thailand, Indo-China* . . . . 4. **G. pinnata** Roxburgh

1. **G. forrestii** W. W. Smith, Not. Bot. Gard. Edinb. 13, 1921, 162; Handel-Mazzetti, Symb. Sin. VII, 3, 1933, 631. — *G. yunnanensis* Hu, Bull. Fan Mem. Inst. Peiping, Bot. Ser. 7, 1936, 212. — *Fig. 2.*

Type specimen: *Forrest 10745* in E, dupl. in A, K.

Distribution: West China (Yunnan, Szechuan).

Trees. Branchlets 0.5—0.8 cm thick, younger parts rather densely pubescent. *Leaves* densely tomentose in all parts, later on glabrescent, especially on upper side of leaflets, 5½—9½-jugate, lowest pairs of leaflets often much smaller and falling earlier; stipules not seen, nor any scars; petioles 5—8.5 cm long, medulla without resiniferous ducts; interjugae 2—3 cm long; stipellae present; leaflets sessile or subsessile, lanceolate to elliptic-oblong, 8—11.5 cm long, 2—4 cm wide, base rounded or broadly acute, apex gradually narrowed, margin serrate; nervation not very prominent, secondary nerves 10—16 and some more in the apex. *Inflorescences* unknown. *Flowers* (one or two flowers persistent on the infrutescences) ca 0.3 cm long. Receptacle tomentose outside, cupular, 0.2 cm long, 0.25 cm in diam. *Sepals* subulate, 0.2 cm long, 0.075 cm wide, tomentose outside, pubescent within. *Petals* ovate, 0.3 cm long, 0.15 cm wide, tomentose at either side. *Stamens* about as long as or shorter than sepals, filaments 0.1—0.15 cm long, tomentose at base. *Disc*-lobes quadrangular. *Gynaecium* reaching about as high as stamens, ovary sessile, globular, pilose, style cylindrical, pilose, stigma 5-lobed. *Infrutescences* lateral and axillary, at tips of branchlets, shorter than the leaves above them, 14—23 cm long, the whole densely pilose, slender, repeatedly branched, with many filiform sterile pedicels, peduncle short, 1.5—5(—7) cm long. *Fruits* 0.7—1 cm long, 0.6—0.8 cm in diam., acute and pointed, stalked, more or less trigonous in cross-section, more or less tomentose, one-seeded; pedicels 0.5—1 cm long, slender; receptacle spreading under the fruit, densely tomentose.

CHINA. Yunnan, Shunning, Hsiaopingkai: *Yü 15885* (A, E), fr. V; Region of Tungshan, Yangtze drainage basin, East of Likiang, on banks of Yangtze: *Rock 10458* (A), fr.; Descent to Yangtze from Eastern boundary of Lichiang Valley: *Forrest 10745* (A, E, K), fr. VIII, *type* of *G. forrestii* Smith; ibid. (f. Smith, l. c.): *Forrest 11410* (A, E), fr. IX; Kien-shuei Hsien: *Tsai 53278* (A), fr. IV, *isotype* of *G. yunnanensis* Hu; no loc.: *Forrest 16629* (CAL, K), fr.; ibid.: *Forrest 16913* (E), fr. IX; Szechuan, Huei-li Hsien: *Yü 1624* (A), fr. X; Ping-shan Hsien: *Yü 3175* (A), fr. VI.

Remarks: This species is thusfar known from a restricted area, but it may well prove to be distributed in a larger part of China and adjacent regions. The inflorescences are very characteristic by being repeatedly and slenderly branched and densely pilose. The type specimen

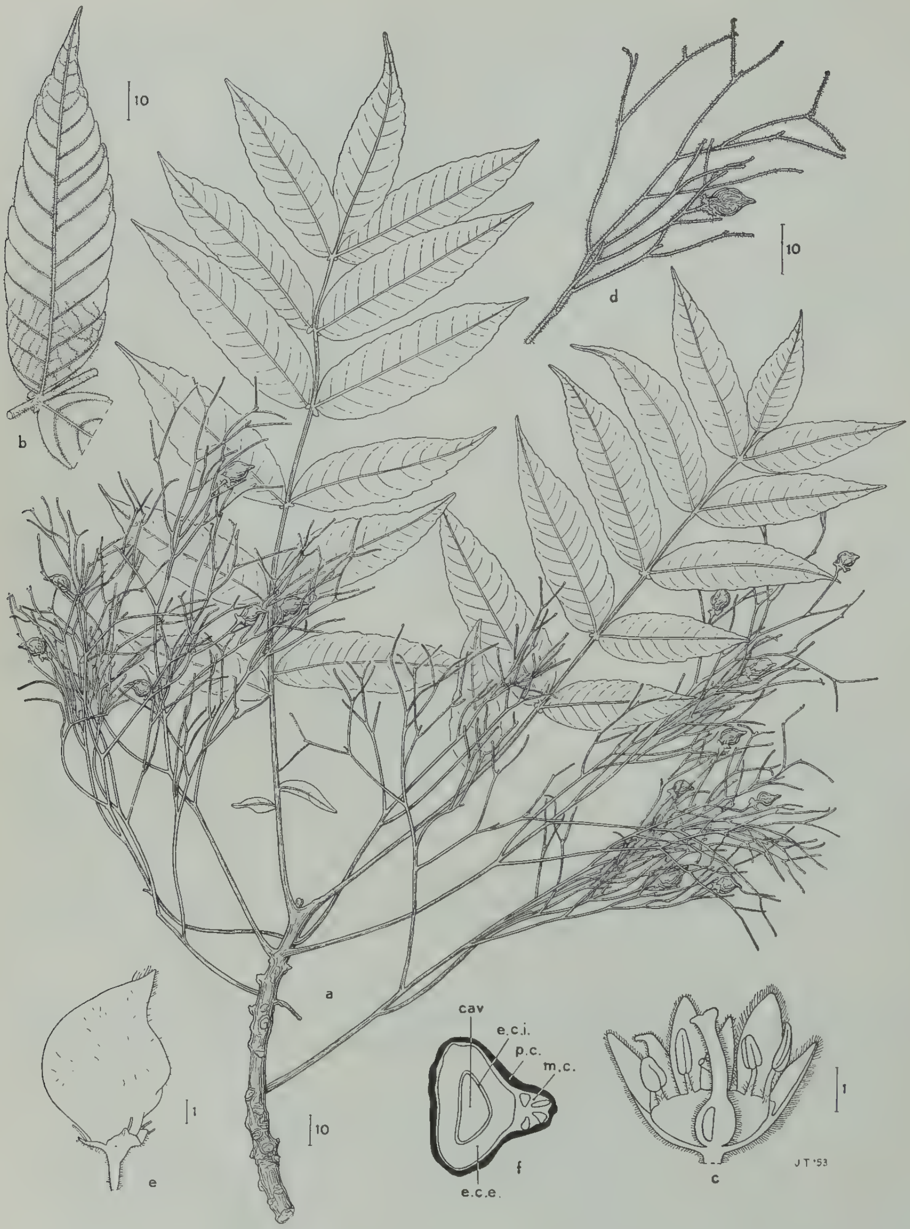

Fig. 2. — *G. forrestii* W. W. Smith — a. branchlet with leaves and infrutescences; b. leaflet showing venation and indumentum; c. longitudinal section of flower; d. part of infrutescence, showing indumentum; e. fruit; f. ditto, cross-section: cav. cavity of embryo, e. c. endocarp (i. interior, e. exterior), m.c. mesocarp, p.c. pericarp. — dimensions in mm — from *Yü 15885*.

of *G. yunnanensis* shows hardly any difference from that of *G. forrestii.*

Trees of 6—15 m high, with greyish black, long fissured bark, the lower side of the leaflets lighter coloured than the upper one. The flowers are said to be white, the fruits green (immature). *Habitat:* known from rather high localities, up to 2100—2400 m, in open slopes and woods. *Flow. and fruit. times:* fr. in IV—VI and in VIII—X.

2. **G. floribunda** Decaisne, Nouv. Ann. Mus. Paris 3, 1834, 477; Walpers, Rep. bot. syst. 1, 1842, 559; Engler in DC, Mon. Phan. 4, 1883, 6; Vidal, Rev. plant. vasc. Fil. 1886, 79; Bailey, Syn. Queensl. Flora, Suppl. 1, 1886, 12; Bailey, Cat. Queensl. Pl. 1909, 85; Ewart & Davies, Fl. North. Terr. 1917, 158; Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 12, 1932, 326, fig. 7 A; Cretzoiu, Fedde Rep. 36, 1934, 265; Burkill, Dict. Econ. Prod. Mal. Penins. 1, 1935, 1061 (sub *G. pinnata*); Sinia, Ann. Jard. Bot. Buitenz. 48, 1938, 85; Webber, Lilloa 6, 1941, 441—465; Lam in Backer, Flora van Java VI B, 1948, 3; Heyne, Nutt. pl. Indon., 3rd ed. 1950, 883 (also sub *G. pinnata*); Meyer Drees, Rep. For. Res. Inst. Bogor 33, 1950; Hildebrand, Rep. For. Res. Inst. Bogor 35, 1950; 43, 1950; 44, 1951; 45, 1951; 49, 1951; 50, 1951. — *Capraria* Rumphius, Herb. Amb. 2, 1741, 139. — *Guaiacum abilo* Blanco, Fl. Fil., 1st ed. 1837, 364. — *Icica abilo* (Blanco) Blanco, Fl. Fil., 2nd ed. 1845, 156. — *Garuga mollis* Turczaninow, Bull. Soc. Imp. Nat. Mosc. 31, 1, 1858, 475; Walpers, Ann. bot. syst. 7, 1868, 546; Vidal, Phan. Cuming. Phil. 1885, 101. — *Boswellia javanica* Turczaninow, Bull. Soc. Imp. Nat. Mosc. 36, 2, 1863, 612 (ex descr.). — *Garuga pacifica* Burkill, J. Linn. Soc. 35, 1901, 30; Setchell, Publ. Dept Mar. Biol., Carn. Inst. Wash. 20, 1924, 85; Christophersen, Bull. B. P. Bish. Mus. 128, 1935, 111. — *Garuga abilo* (Blanco) Merrill, Phil. Govt. Lab. Publ. 35, 1905, 75; Burkill, Dict. Econ. Prod. Mal. Penins. 1, 1935, 1061; Heyne, Nutt. pl. Indon., 3rd ed. 1950, 882. — *Garuga gamblei* King ex Smith, Rec. Bot. Surv. India 4, 1911, 262; Gamble, Fl. Pres. Madras 1, 1915, 169; Calder c. s., Rec. Bot. Surv. India 11, 1, 1926, 57; Cowan c. s., Trees N. Bengal 1929, 30; Merrill, Lingnan Sc. J. 14, 1, 1935, 17 (sub *G. pinnata*); Kanjilal c. s., Fl. Assam 1, 2, 1936, 222. — *Garuga littoralis* Merrill, Phil. J. Sc. 10, 1915, 27 (ex descr.), incl. var. *paucijuga* Merrill, l. c. p. 29 (ex descr.). — *Garuga clarkii* Merrill, Phil. J. Sc. 10, 1915, 29. — *Garuga* spec., Christophersen, Bull. B. P. Bish. Mus. 128, 1935, 111. — *Fig. 3 a—b.*

Type specimen: *Unknown coll.* (*Leschenault de la Tour c. s.,* voyage in "Naturaliste" and "Géographe") *s.n.*, from Timor, in G, dupl. in NY. (see Remarks).

Distribution: Continent of Asia (India, Sikkim, East Pakistan, West China, Hainan), North Borneo, Mid and East Java, Philippines, Celebes, Lesser Sunda Islands, Moluccas, New Guinea, Northern Australia, Western Pacific Islands (Solomon Islands, New Hebrides, Samoa, Tonga).

Remarks: *G. floribunda* and *G. gamblei* are here considered as varieties of one species, the differences being slight.

Trees. Branchlets 0.4—1 cm thick, glabrous except young parts, often rough by many leaf-scars. *Leaves* 4½—10½(—15½)-jugate, usually pubescent when young and glabrate, but indumentum very variable, lowest pairs of leaflets forming transitions to stipules and deciduous; stipules oblong, 0.5—0.8 cm long, deciduous; petioles not or hardly flattened at base, 4.5—12.5 cm long, 0.2—0.7 cm thick at base, medulla with (0—)2(—more) resiniferous ducts; interjugae 2—6 cm long; stipellae extant or wanting; leaflets elliptic, oblong-lanceolate or lanceolate, 5—19 cm long, 2—5.5(—7) cm wide, base oblique, rounded, sometimes more acute, apex gradually acuminate, margin crenate-serrate, sometimes nearly entire, petiolules 0.1—0.5 (—0.9) cm long, terminal ones 0.6—3.3 cm long; secondary and tertiary nervation not very prominent, secondary nerves 10—20. *Inflorescences* lateral or axillary, conferted at tips of branchlets, paniculate, 4—37 cm long, pubescent to glabrous; peduncle 0.5—14 cm long; bracts lanceolate to oblong, 0.3—1.2 cm long, deciduous. *Flowers* 0.35—0.6 cm long when adult. Pedicels 0.1—0.4 cm long, pubescent. Receptacle cupular, 0.15—0.2 cm long, 0.25—0.45 cm in diam., pubescent without. *Sepals* deltoid, 0.15—0.25 cm long, 0.1—0.2 cm wide, pubescent at either side, especially without. *Petals* ovate to oblong-lanceolate, 0.3—0.5 cm long, 0.1—0.2 cm wide, pubescent without, tomentose within, at least at base. *Stamens* slightly didynamous, the longer ones episepalous, about as long as or longer than sepals, filaments 0.1—0.3 cm long, pubescent or tomentose at base. *Disc*-lobes deltoid to quadrangular. *Gynaecium* reaching same height as stamens, ovary globular, on a short gynophore, pilose to glabrous, style cylindrical, slightly tomentose to pilose, stigma 5-lobed. *Fruits* one- to five-seeded, 0.5—0.9 cm long, 0.5—1.2 cm in diam., sometimes densely pubes-

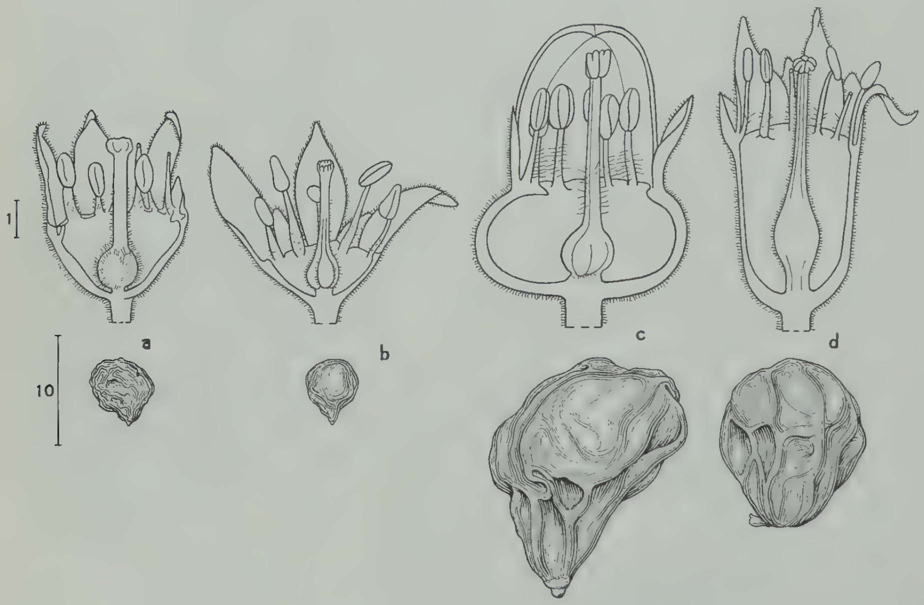

Fig. 3. — Flowers (longit. section) and fruits of *Garuga*-species — a. *G. floribunda*, var. *floribunda*; b. *G. floribunda* var. *gamblei*; c. *G. pierrei*; d. *G. pinnata* — dimensions in mm.

cent but usually glabrous or with some scattered hairs, sepals deciduous, receptacle persistent.

Var. **floribunda** — (synonymy as under species, except *Garuga gamblei* King ex Smith). — Inflorescences 4—21 cm, rarely up to 30 cm long, peduncle 0.5—9 cm long. — *Fig. 3 a.*

Distribution: North Borneo, Central and East Java, Philippines, Celebes, Lesser Sunda Islands, Moluccas, New Guinea, Northern Australia, Pacific Islands.

Borneo. North Borneo, Semporna, Bod Gaya Is: *Orolfo 36376 = 3799* (BO, K, KEP), fr. III.

Java. East Java, Pasuruan, cultivated: *Backer 36479* (L), fr. X; Djember, G. Watangan: *NIFS Ja 4908* (A, L), fr. II.

Philippines. Palawan, without loc.: *Nativadad 23353* (A, BO, K), fr. IX; ibid.: *Cenabre, Baldemor & Aduviso 27976* (A); Luzon, Nueva Ecija Prov.: *Curran 8478* (P); Cagayan de Sulu: *Merrill 5301* (NY), fr. X; Masbate: *Clark 1700* (NY), fr. V—VI, *isotype* of *G. clarkii* Merr.

Celebes. Manado, Bolaäng Mongoudow, Langagon: *NIFS bb. 32486* (BO, L), fr. XI; Boalemo, Bilatto: *NIFS bb. 15047* (L); Poso, Kalora: *NIFS bb. 28739* (A, L); ibid., Uëkuli: *NIFS bb. 31482* (A, L), fr. II; Muna, Laiwaru: *NIFS bb. 32371* (BO, L); Raha, Wasalangka: *NIFS bb. 20250* (A, BO, L), fr. I; ibid.: *NIFS bb. 21336* (A, BO, L); Labunti: *NIFS bb. 32750* (BO, L).

Lesser Sunda Islands. Bali, Prapatagung: *Becking 42* (L); Lombok, West Lombok, Embung: *NIFS bb. 21398* (A, L), fl. IX; G. Rindjani. Sewela near Pringgabaja: *Elbert 2042* (L); Sumbawa, Bima: *Zollinger 3355* (A, L, P), fl. VIII; Flores, Ngada, Aimere: *NIFS bb. 21431* (BO), fl. IX; Timor, Kupang, Noëmina: *NIFS bb. 27067* (A, L); ibid., no loc.: *de Vriese s.n.* (A, L), fr.; Timor, without loc.: *Spanoghe s.n.* (L), fl.; ibid.: *Zippelius s.n.* (L), fr.; ibid.: *Alfaro Cardosa 11/20* (NY), fr.; ibid.: *Unkn. coll.* (*Leschenault de la Tour c.s.*, voyage with "Naturaliste" and "Geographe") *s.n.* (G, NY), fl., *type* of *G. floribunda* Decne, see Remarks.

Moluccas. Sula Islands, Mangoli, Northern Mangoli: *NIFS bb. 29761* and *bb. 29870* (A, L); Sanana, Tandjung Baleha: *NIFS bb. 28775* (A, L); Wetar, Kali M. Lahela: *NIFS bb. 27235* (BO); Morotai, Tobelo: *NIFS bb. 33777 = Tangkilisan 83* (A, BO, L), fl. & fr. V; Ternate, Kapi, Dau Kambin: *Beccari s.n.* (FI), fl. IX; Ambon, no loc.: *Teysmann s.n.* (L), fr.; Tanimber Isl.: Ilgnei-Otimmer: *NIFS bb. 24265* (L).

New Guinea. West New Guinea, Inanwatan, Tisa: *NIFS bb. 32633 = Lundquist 14* (BO, L); North New Guinea, Hollandia, Nimburan, Berap: *NIFS bb. 29002* (L); Aitape District, Aitape: *McAnalan NGF 508* (L); ibid., Tadji Airstrip: *Smith NGF 1245* (L); Morobe District, Kajabit Mission: *Clemens 10873* (A), fr. XII; ibid., Markham Valley: *Clemens 10805* (A), fr. X; Bulolo: *Womersley 3560* (A), fr. XI; ibid.: *Gray 3566* (A, L), fr. XI; ibid.: *Fryar 4011* and *4017* (A), fr. II; Yalu: *Unknown coll. NGF 220* (L); Nadzab near Lae: *Womersley 4628* (L), fr. X; Papua, Port Moresby: *Carr 11862* (BM, L), fr. IV; ibid., Loloki River: *Brass 542* (A, K), fr. X; Papua, without loc.: *De Zeeuw 46* (M), fl. & fr. I.

Australia. North West Coast, Port Nelson: *Cunningham 228* (BM), fl.; ibid.: *Cunningham s.n.* (K), fl.

Pacific. Solomon Isl., Guadalcanal. Matepona River: *Walker & White BSIP 14* (A), fr. VII; ibid., no loc.: *Walker BSIP 298* (A), fl. VII; New Hebrides, Tanna Isl., Lenakel: *Kajewski 135* (A), fr. III; Efate: *Burton 32* (A), fl.; Hog Harbour: *Baker 2* (BM), fl. IX; Samoa Isl., Savaii, Salailula: *Christophersen 2847* (A, NY), fr. X, see Remarks; ibid., Salailua-Lataitai: *Christophersen 2861* (A, NY); ibid., Falelima-Siuvao: *Christophersen 3308* (BISH, K, NY), fr. XI, see Remarks; Samoa, without loc.: *Whitmee s.n.* (BM, E), fl.; ibid.: *Powell 19* (K), fl. & fr.; Tonga Isl., Vavau: *Crosby 291* (K), fl., *type* of *G. pacifica* Burk.; Tongatabu: *Setchell & Parks 15447* (NY); Tonga, without loc.: *McKern 98* (BISH).

Remarks: From Geneva (Herb. Delessert) I received a Timor specimen "Ex Herb. Mus. Paris", bearing no collector's name but with in Decaisne's handwriting: "Garuga floribunda Dne". I consider this the type specimen. A duplicate of this specimen from the Torrey herbarium is in the New York Botanical Garden Herbarium.

The flowers of this variety are rather variable as to the indumentum: in sepals, petals, filaments and ovary it varies from densely tomentose to almost none. A glabrous ovary is especially found in Pacific specimens.

The specimens *Christophersen 2847* and *3308* (of which the latter was mentioned by Christophersen (l. c.) as *Garuga* species) have unusually large fruits (0.8—1.2 cm long, 0.7—1.2 cm in diam.). Possibly these specimens belong to a separate species or variety (*G. pacifica* Burk.) but for a definite decision specimens with flowers and fruits from the same tree, are needed, the differences in the flowers between the typical *G. floribunda* and the type of *pacifica* being, in my opinion, insufficient to justify a specific separation.

Trees, up to 35 m high, buttressed, with grey or brown flaking bark that exudes a colourless or white sap. Leaves paler underneath. Flowers yellowish; fruits green when immature, blue when ripe. *Habitat:* From sea level up to ca 400 m alt., in primary and secondary forests, in flat or sloping countries. *Vernac. names:* balo (Br. N. Born.); telul, kambing, kaju kambing, adju barru, bogu, wou, empo (Cel.); beru, wuru (Bali); ai-feu (Timor); héu (Wetar); kambing (Morotai); maruapisa (W. New Guin.); kagi-kagi (Papua); namalaous, nalü (N. Hebr.); mangaui (Samoa); manaui (Tonga). *Flow. and fruit. times:* In Born. fr. in III. In Java fl. in VII—XI, fr. in IX—III. In Philipp. fl. in III—VI, fr. in III—X. In Cel. and Kangean fl. in IX—X, fr. in XI—V. In Less. Sunda Isl. fl. in VIII—IX, fr. in IV (Sumba). In Moluccas fl. in IX—XI (Ternate), fr. in V (Morotai). In N. Guin. fl. in I (Papua), fr. in X—IV. In Pacific fl. in VII—IX, fr. in VII—III. In general, flowering at the end of the dry or the beginning of the wet season, leaves deciduous in the dry season, appearing again when the fruits ripen. *Uses:* the leaves are used as goat-fodder (Mol.), the fruits are edible. See further Heyne, l. c.

Var. **gamblei** (King ex Smith) Kalkman, nov. stat. — *Garuga gamblei* King ex Smith, Rec. bot. surv. India 4, 1911, 262; for bibliography see under species. — Inflorescences (11—)18—37 cm long, peduncle (6.5—) 9—14 cm long. — *Fig. 3 b.*

Type specimen: *Kari 4169* in E.

Distribution: India, Sikkim, East Pakistan, West China, Hainan. Sofar not known from Burma, Thailand, and Indo-China.

INDIA. North West Prov., Bharut: *Wallich 8485 E* (E), fl.; Hardwar (mixed with Sylhet specimens): *Wallich 8485 D* (K, L), fl.; Madras, Nilgiris: *Gardner s.n.* (K), fr.; ibid., Serurghal: *Lawson s.n.* (K), fl. & fr. III; Kodaikanal Region, Palney Hills: *Uhl s.n.* (*Anglade* collection) (A), fr.; Bengal, Darjeeling, Chumbati, Daris Hills: *Gamble 600 A* (K), fr. IV; Chumbati: *Gamble 600 D* (CAL), fr. IV.

SIKKIM. Tista Valley: *Ribu 4998* (E, K), fl. IV; above ? Surtie: *King s.n.* (K), fr. VI; near Sittong: *Kari 4169* (E), fl. IV, *type* of *G. gamblei* King ex Sm.; no loc.: *King 2385* (CAL), fr. ? VII.

EAST PAKISTAN. Sylhet (mixed with Hardwar specimens): *Wallich 8485 D* (K, L), fl.

CHINA. Yunnan, Che-li Hsien, Kuen-ger: *Wang 79216* (A), fr. X; ibid., Maan-kung-han, Dah-meng-lung: *Wang 78602* (A); Hainan, Yaichow: *How 70547* (K, NY), fl. III—VII; Ch'ang-kiang Distr., Ka Chik Shan & vic.: *Lau 1436* (BM, NY), fl. III; Ngai Distr., Naam Shan Leng, Pakatas: *Lau 234* (B, E, NY), fr. VII; ibid., Pak Kok Nam: *Lau 324* (B, E, K, NY).

Remarks: Trees up to 18 m high. Flowers fragrant, pale yellow with dark brown anthers and blue stigma. Fruits green. *Habitat:* in thickets and forests, on dry or moist places, from 200—1500 m alt. *Flow. and fruit. times:* In India fl. in III, fr. in III—IV. In Sikkim fl. in IV, fr. in VI—VII. In Yunnan fr. in X, in Hainan fl. between III—VII. *Uses:* In Hainan the wood is used for more expensive furniture (*Lau 324*).

3. **G. pierrei** Guillaumin, Rev. gén. de Bot. 19, 1907, 164; Lam, Bull. Jard. Bot. Buitenz. Sér. 3, 12, 1932, 331, fig. 7 C. — *G. pinnata* Roxb. var. *pierrei* (Guill.) Cretzoiu, Acta Fauna et Flora Univ., Ser. 2, vol. 1, 9, 1933, 6. — *Fig. 3 c.*

Type specimen: *Pierre 909* in P, dupl. in A, K.

Distribution: Yunnan, Thailand, Cambodja.

Trees. Branchlets 0.4—0.8 cm thick, glabrous except tips. *Leaves* 5½—8½-jugate, glabrous or slightly pubescent, lowest pairs of leaflets showing transitions to stipules; petioles hardly flattened, 4.5—6.5 cm long, 0.2—0.3 cm thick, medulla with two or without resiniferous ducts; stipules elliptic-oblong, ca 0.3 cm long, deciduous; interjugae 2—3 cm long; stipellae wanting or extant; leaflets ovate-elliptic to elliptic-oblong, 4—10 cm long, 2—4 cm wide, base oblique, rounded to broadly acute, apex shortly, broadly and bluntly acuminate to more gradually narrowed, margin crenate-serrate; petiolules 0—0.3 cm long, terminal ones 0.2—2.5 cm long; secondary nerves 10—15 and some more in the apex. *Inflorescences* shortly paniculate, 6—17 cm long, pubescent, peduncle short, 1—7 cm long. *Flowers* 0.6—0.7 cm long; pedicels 0.1—0.4 cm long, pubescent. Receptacle bulging, 0.3 cm long, 0.5—0.6 cm in diam., pubescent without. *Sepals* deltoid, 0.25—0.3 cm long, 0.15—0.2 cm wide, pubescent at both sides. *Petals* oblong-lanceolate, 0.4—0.5 cm long, 0.15—0.175 cm wide, pubescent without, long tomentose within, especially at base. *Stamens* monodynamous, about as long as sepals, filaments 0.2—0.25 cm long, long tomentose at base. *Disc*-lobes deltoid-trapeziform. *Gynaecium* reaching about same height as or higher than stamens, ovary globular, more or less 5-lobed, glabrous, on a short or moderate gynophore, style more or less pilose, cylindrical, stigma 5-lobed. *Fruits* glabrous, 1—2.3 cm long, (0.9—)1.2—1.6 cm in diam.

CHINA. Yunnan, Che-li Hsien, Sheau-meng-yeang: *Wang 75604* (A), fr. VIII, see Remarks.

THAILAND (Siam). Tripagodas (Birma border): *Kostermans 358* (L), fr. (and some fl.) V.

INDO CHINA. Cambodja, Prov. Samrongtong, Mt Sehval: *Pierre 909* (A, K, *isotypes* of *G. pierrei* Guill.), fl. IV; Prov. ? Upong, Kuang Kepoen: *Pierre 909a* (*a* added by Lam, see Lam l. c.) (K), fr. V; ibid., Roleak Kan Chieu: *Pierre 909c* (*c* added be me) (NY).

Remarks: Cretzoiu, l. c., reduces this species to a variety of *G. pinnata.* It resembles the latter very much, indeed, but is distinguished from it by its bulging receptacle and its larger fruits. This is why I prefer keeping the two species apart.

The specimen *Wang 75604* has rather small fruits and resembles *G. pinnata,* but it shows stipellae which are not known in that species.

Trees up to 25 m high, with flaking grey-brown bark. Fruits green. *Flow. and fruit. times:* fl. in IV, fr. in V (Thailand, Camb.) and in VIII (Yunnan).

4. G. pinnata Roxburgh, Hort. Beng. 1814, 33; Sprengel, Syst. veget. 2, 1825, 313; Wallich, Cat. 1828, nr 8485; Spach, Hist. nat. vég. 2, 1834, 245; Wight & Arnott, Prodr. Fl. Penins. Ind. Or. 1, 1834, 175 (excl. syn. *G. madagascariensis* DC); Hamilton, Trans. Linn. Soc. 17, 1835, 190; Walpers, Rep. bot. syst. 1, 1842, 559; Walpers, Ann. bot. syst. 3, 1853, 843; Drury, Handb. Ind. Fl. 1, 1864, 249; Beddome, Fl. sylv. 1, 1869, 118; Brandis, For. Fl. N.W. & Centr. Ind. 1874, 62; Engler in DC, Mon. Phan. 4, 1883, 5 (incl. var. *sikkimensis* Engl. and var. *obtusa* Engl.); Prain, J. As. Soc. Beng. 62, 2, 1893, 39; Duthie, Fl. Upper Gangetic Plain 1, 1, 1903, 148; Gage, Rec. bot. surv. Ind. 3, 1, 1904, 34; Prain, Rec. bot. surv. Ind. 3, 2, 1905, 186; Brandis, Ind. trees 1906, 131; Craib, Contr. Fl. Siam 1912, 35; Gamble, Fl. Pres. Madras 1, 1915, 169; Fischer, Rec. bot. surv. Ind. 9, 1, 1921, 46; Cowan c.s., Trees N. Bengal 1929, 30; Lam, Bull. Jard. Bot. Buitenz., Sér. 3, 12, 1932, 330, fig. 7 B; Cretzoiu, Fedde Rep. 36, 1934, 265; Burkill, Dict. Econ. Prod. Mal. Penins. 1, 1935, 1061; Kanjilal c.s., Fl. Assam 1, 2, 1936, 221; Sinia, Ann. Jard. Bot. Buitenz. 48, 1938, 85, 92; Webber, Lilloa 6, 1941, 441—465; Bal, Rec. bot. surv. Ind. 6, 10, 1942, 45. — *Katou-Kalesjam* Van Rheede tot Draakenstein, Hort. Ind. Malabar. 4, 1673, 69. — *Sorbus Spuria Malabarica* Ray, Hist. Plant. Univ. 2, 29, 1688, p. 1643; Plukenett, Almagesta 1696, 355. — *Kunthia cochinensis* Dennstedt, Schl. z. Hort. Ind. Malab. 1818, 30. — *Garuga ? kengkar* Hamilton, Trans. Linn. Soc. 17, 1835, 191. — *Garuga ? khamar* Hamilton, l. c. p. 191. — *G. pinnata* Roxb. var. *genuina* (Roxb.) Cretzoiu (sic!), Acta Fauna et Flora Univ., Ser. 2, vol. 1, 9, 1933, 6. — *Fig. 3 d.*

Type specimen: *Roxburgh s.n.* in K, dupl. in BM.

Distribution: South East Continental Asia: India (not in Ceylon), Sikkim, East Pakistan, Burma, South China, Thailand, Indo China.

Trees. Branchlets 0.5—0.8 cm thick, glabrous except the pubescent younger parts, often rough because of the large leaf scars. *Leaves* 4½—11½-jugate, pubescent when young, glabrate, lowest pairs of leaflets showing transitions to stipules; stipules spathulate to linear, 0.5—1 cm long, deciduous; petioles hardly flattened at base, (5—)6.5—11.5 cm long, 0.2—0.3 cm wide at base, medulla without resiniferous ducts; interjugae 2—4 cm long; stipellae wanting; leaflets usually sessile or subsessile, sometimes with a short petiolule (up to 0.2—0.4 cm), elliptic or oblong to lanceolate, base oblique, usually rounded, sometimes broadly or more narrowly acute, apex contracted into an usually long and narrow acumen, margin serrate-crenate, 5.5—14.5 cm long, 2—5.5 cm wide; nervation usually not very prominent, especially above, secondary nerves 10—15 and some more in the apex. *Inflorescences* lateral, conferted at tips of branchlets, paniculate, 7.5—19(—22) cm long, pubescent when young, usually more or less glabrescent when older; peduncle (1—)2—6 cm long; bracts deciduous. *Flowers* 0.6—0.8 cm long, when open; pedicels 0.1—0.3 cm long, pubescent. Receptacle cylindrical, 0.3—0.45 cm long, 0.35—0.45 cm in diam., pubescent outside. *Sepals* deltoid, 0.25—0.35 cm long, 0.15—0.25 cm wide, rather long tomentose at both sides. *Petals* oblong, 0.5—0.55 cm long, 0.15—0.2 cm wide, tomentose at both sides. *Stamens* slightly didynamous (longer ones episepalous), reaching same height as gynaecium, filaments 0.25—0.3 cm long, about half as long as petals, with long hairs at base. *Disc*-lobes trapeziform to deltoid. *Ovary* globular, on a short gynophore, pilose as is the cylindrical style, stigma 5-lobed. *Fruits* irregularly globular, 1.1—1.5 (—1.8) cm long, (0.9—)1.1—1.8 cm in diam., one- to five-seeded, pericarp carnose, sometimes pubescent, calyx deciduous, receptacle persistent, small, annular.

INDIA. Bombay, North Konkan, Karjat: *Fernandes 254* (A), fl. & fr. IV; Belgaum, Durga: *Ritchie 1016* (E, K), fl. III; ibid.: *Ritchie s.n.* (E), fr. VIII; North Kanara, Kumta-Sirsi Road, Katgal: *Fernandes 222* (A), fl. III; no loc.: *Geburne 50* (K); ibid.: *Law s.n.* (K), fl. & fr.; Mysore, no loc.: *Hamilton s.n.* (BM), fl.; Punjab: Pentapotamica, between Bargodam and Kalka, beneath Kasauli: *Drummond 3111* (E), fl. V & fr.; ibid., between Bargodam and Kasauli: *Drummond 3112* (E), fr. V; Siwalik and Jaunsar Div., Lacchiwala: *Ram Chandra Sethi 31* (A), fl. & young fr. V; ibid., Kaluwala: *Habib Bakhsh 28* (NY), fl. V; North West Prov., Dehra Dun and vic., Bindal Nala: *Umrao Singh 336* (NY), fr. V; ibid., Mohaud Pass: *Stewart 11121* (NY), fl. VIII; Upper Gangetic Plain, Distr. Gorakhpur: *? Harsukh 21385 b* (A, K), fl. IV; ibid., Gonda: *? Harsukh 21387* (K), fr. V; ibid., Kheri: *Inayat 21386b* (K), fl. IV; Cosala, Rudrapur: *Hamilton 1048* (E), *type* of *G. ? kengkar* Ham.; ibid., Gorakhpur: *Hamilton 1049* (E), fl. IV, *type* of *G. ? khamar* Ham.; Nizam's Dominions, Hyderabad, Kodmial: *Edwards 3* (K), fl. II; Madras, Ganjam Distr., Mohiri Hills: *Gamble 14211* (K), fl. III; Karnool, Nala Malai: *Beddome s.n.* (BM), fl. & young fr.; Vizianagram: *Campbell s.n.* (E), fl. II; no loc.: *Bourne s.n.* (K), fl. IV; Bengal (see also under East Pakistan), Chota-Nagpore, Kumandi Res., Palamau: *Gamble 8779* (K); Orissa, Tanghi, Khurdha: *Gamble 9306* (K), fl. II; Singbhum: *Haines 190* (K), fl. & fr. IV; Northern Bengal, Madhepur Jungle: *Biswas 1547* (A, NY); Calcutta, Botanic Gardens: *Wallich 8485 F* (E, K), fl.; Assam, Gauhati: *Chatterjee s.n.* (A), fr. IV—V; ibid., Jata Hill: *Prain's coll. s.n.* (A); no loc.: *Jenkins s.n.* (L), fl.; Andaman Isl., Long Island: *Parkinson 660* (K), fr. VII; East Indian Peninsula, without loc.: *Wight 398* (K, L), fl.; ibid.: *Wight 2324* (L, NY), fl., *type* of var. *obtusa* Engl.; ibid.: *Roxburgh s.n.* (BM, K), fl., *type* of *G. pinnata* Roxb.

SIKKIM. Banks of Tista: *King's coll. s.n.* (L), fr. VIII; no loc.: *Hooker s.n.* (BM, L), fr., *type* of var. *sikkimensis* Engl.

EAST PAKISTAN (see also under India, Bengal). Bengal, Chittagong: *Cowan 29* (E), fl.: ibid., ? Ruybheny: *Cowan 1406* (E), fl. & fr.; ibid., Kaptai: *Hooper 25873* (E); Chittagong Hill Tracts: *King's coll. 4* (E); ibid., Rangamati: *Gamble 7929* (A), fl. III.

BURMA. Upper Burma, Maymyo: *Lace 3114* (K), fl. IV; ibid.: *Lace 3187* (E), fr. V; Kaing Res., Pyinmana: *Burma For. Sch. Herb. Ser. 6* (KEP), fl. II; ibid.: *Burma For. Sch. Herb. s.n.* (K), fl. & fr. IV; Southern Shan State, Saga: *Abdul Khalil s.n.* (A); Paunglaung: *Burma For. Sch. Herb. Ser. 56* (NY), fl. III; Burma, towards ? Casneir: *? Griffith 1136* (K), fl. VIII & IX.

CHINA. Yunnan, Fo-Hai: *Wang 74680* and *74726* (A), fr. VI; ibid.: *Wang 76199* (A), fr. VII; Che-li Hsien, Ban-chiou-chian: *Wang 79702* (A), fr. X; ibid., Sheau-meng-yeang: *Wang 75563* (A), fr. VIII; ibid., Sheau-bang-chou-chian: *Wang 79651* (A), fr. IX; ibid., Dahmeng-lung: *Wang 77664* (A), fr. VIII; Kwang-si, Kwei-loo, S. Hin Yen: *Ching 7290* (NY), fr. IX.

THAILAND (Siam). Kankiang Radburi: *Teysmann 5951* (L), fl.: Lakon: *Kerr 1002* (L), fl. II; Kwae Noi Basin, Distr. Wangka: *Kostermans 990* (L), fr. V.

INDO CHINA. Tonkin, Route des Rochers Notre Dame: *Pételot 6402* (A, NY), fl. III; Annam, Nha-trang and vic.: *Robinson 1500* (BM), fl. III; Cambodja, Kompong Cham: *Béjaud 432* (A, NY), fl. VII; Cochin China, Bienhoa, Bao Chiang: *Pierre 909b* (*b* added by me) (BM), fr. VII.

SOUTH ASIA. Taepe?: *unknown coll. 839* (L), fr. IV; Moalmyne and Akran: *Wallich 8485 C* (K), fl.; Kalahandi State: *Haines 5530* (K), fr. V; Sukanagur: *Hamilton 1046/1* (E), fl. IV; Dumuriyagunj: *Hamilton 1046/2* (E); Magadha, Kororiya: *Hamilton 2530* (or *2538*) (E); Kalesar: *Lace 48* (E), fl. IV; Simachallam: *Cleghorn s.n.* (E), fr. II; Phandowala: *Hans Raj Dutt 20* (NY), fl. IV & fr. X; no loc.: *Ritchie s.n.* (E); ibid.: *Cleghorn s.n.* (E); ibid.: *? Jamesion 446* (E), fl.; ibid.: *Beddome s.n.* (BM), fl.

Remarks: Shrubs or small to moderate-sized trees, not higher than 15 m. Bark grey, rough (one record only), leaflets lighter beneath, flowers yellowish, fruits green, turning yellow. *Habitat:* in thickets and (not very dense?) forests, from 100—1500 m alt., but most records from 800—1050 m. *Vernac. names:* shemat (Bombay), amra (Punjab), gargu (Nizam's Dom.), chinyok (Burma), majoin kien (Thailand). *Flow. and fruit. times:* In India fl. in II—V and VIII, fr. in IV—VIII. In Sikkim fr. in VIII. In East Pakistan fl. in III. In Burma fl. in II—IV and VIII—IX, fr. in IV—V. In South China fr. in VI—X. In Thailand fl. in II, fr. in V. In Indo-China fl. in III and VII, fr. in VII. *Uses:* No records of uses are found on the labels, but according to Kanjilal c.s. (l. c.) and other authors the bark is used for tanning and the leaves as fodder for buffaloes etc. Roxburgh and others say that the fruits are edible and usually pickled.

Excluded species.

Garuga madagascariensis De Candolle, Prod. 2, 1825, 81. — *Cupania chapelieriana* Cambessedes, Mém. Mus. Paris 18, 1829, 44. — *Jagera madagascariensis* Blume, Rumphia 3, 1847, 155. — *Tina madagascariensis* (DC) Radlkofer, Sitz.ber. d. math.-phys. Classe d. k. b. Akad. Wiss. Münch. 9, 1879, 662 (non *T. madagascariensis* DC, Prod. 1, 1824, 614); Engler in DC, Mon. Phan. 4, 1883, 7; Choux, Cat. Plant. Madag., Sapind. 1931, 13.

= **Tina chapelieriana** (Cambessedes) Kalkman, nov. comb. (Sapind.). (Types not examined).

Garuga javanica Blume, Bijdragen 1826, 1165; Walpers, Rep. bot. syst. 1, 1842, 559. — *Jagera speciosa* Blume, Rumphia 3, 1847, 155. — *Jagera javanica* Blume, Mus. bot. Lugd.-Bat. 1, 15, 1850, 227.

= **Jagera javanica** (Blume) Blume (Sapindaceae). Type specimen: *?Korthals s.n.* (L, nrs 908.270—346/356).

Garuga ? pharhad Hamilton, Trans. Linn. Soc. 17, 1835, 191. The type specimen (*Hamilton 1047* [E] from Cicata, Tilautta) is sterile, but does very probably not belong to *Garuga*.

List of collectors' numbers.

Numbers in parentheses refer to the number of the species in the present article.

Abdul Khalil s.n. (4); Aduviso, see Cenabre etc.; Alfaro Cardosa 11/20 (2a); Analan, see McAnalan; Anglade, see Uhl.

Backer 36479 (2a); Baker 2 (2a); Bakhsh, see Habib Bakhsh; Baldemor, see Cenabre etc.; Beccari s.n. (2a); Becking 42 (2a); Beddome s.n. (4); Béjaud 432 (4); Biswas 1547 (4); Bourne s.n. (4); Brass 542 (2a); BSIP 14 (2a), 298 (2a); Burma For. Sch. Herb. 6 (4), 56 (4), s.n. (4); Burton 32 (2a).

Campbell s.n. (4); Cardosa, see Alfaro Cardosa; Carr 11862 (2a); Cenabre, Baldemor & Aduviso 27976 (2a); Chatterjee s.n. (4); Ching 7290 (4); Christophersen 2847 (2a), 2861 (2a), 3308 (2a); Clark 1700 (2a); Cleghorn s.n. (4); Clemens 10805 (2a), 10873 (2a); Cowan 29 (4), 1406 (4); Crosby 291 (2a); Cunningham 228 (2a), s.n. (2a); Curran 8478 (2a).

Drummond 3111 (4), 3112 (4).

Edwards 3 (4); Elbert 2042 (2a).

Fernandes 222 (4), 254 (4); Forrest 10745 (1), 11410 (1), 16629 (1), 16913 (1); Fryar 4011 (2a), 4017 (2a).

Gamble 600 A (2b), 600 D (2b), 7929 (4), 8779 (4), 9306 (4), 14211 (4); Gardner s.n. (2b); Geburne 50 (4); Gray 3566 (2a); Griffith 1136 (4).

Habib Bakhsh 28 (4); Haines 190 (4), 5530 (4); Hamilton 1046/1 (4), 1046/2 (4), 1048 (4), 1049 (4), 2530 (or 2538) (4), s.n. (4); Hans Raj Dutt 20 (4); Harsukh 21385b (4), 21387 (4); Hooker s.n. (4); Hooper 25873 (4); How 70547 (2b).

Inayat 21386b (4).

Jamesion 446 (4); Jenkins s.n. (4).

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Cupania chapelieriana Camb. (Excl. spp.)
Garuga Roxb.
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— *clarkii* Merr. (2)
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— — *var. gamblei (King ex Sm.) Kalkm. (2)
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— — var. *genuina* Cretz. (4)
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— *speciosa Bl.* (Excl. spp.)
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Kunthia H. & B.
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— *madagascariensis* (DC.) Radlk. (Excl. spp.)

Dr D. F. VAN SLOOTEN †.

On March 7, 1953 the Rijksherbarium suffered a severe loss by the sudden death of its honorary co-operator Dr. D. F. van Slooten, the well-known specialist particularly of *Dipterocarpaceae*. To honour his memory the following lines may serve as an obituary note.

Dirk Fok van Slooten was born in Amersfoort on 17 March 1891. In the local gymnasium his biology teacher was the later Prof. A. Pulle, who was again his master at the University of Utrecht where he was matriculated in 1910. His doctor's thesis of 1919 was dealing with the *Combretaceae* and *Flacourtiaceae* of the Dutch East Indies.

A few months after obtaining his Ph. D. he left for Java, the country in which he was to spend more than 30 years, first as a botanical assistant to the Buitenzorg (now Bogor) Herbarium, from 1931 as its director. In 1934—1935 he was acting director of the famous Botanical Garden "'s Lands Plantentuin", which position he again filled from 1940—1943. From 1 January 1949 to 1 February 1950 he was director of the Royal Botanical Garden of Indonesia, the last director under the Dutch regime. On the last-named date he was succeeded by Ir. (now Prof.) R. Kusnoto, the first Indonesian director, whom the botanical world welcomed as a man of outstanding ability.

Next to the plant families mentioned, Van Slooten devoted his attention to the *Stylidiaceae* and, above all, the *Dipterocarpaceae*. Together with Dr. C. A. Backer, he wrote the well-known illustrated handbook on Javanese tea weeds.

In the beginning of 1951 Dr. and Mrs. Van Slooten returned to the mother country, where their children had preceded them. He found an abode at Amsterdam and a working place in the Royal Institute for the Tropics (the former Royal Colonial Institute), where he continued his studies on the Dipterocarps in his quiet, unobtrusive way.

As a scientist, Van Slooten was a slow but painstakingly meticulous and extremely reliable worker. He was a man who, though perhaps lacking the flair of the artist, yet displayed a wealth of thoroughness which was something of an art in itself. He was not a man of adventurous tours and hazardous expeditions, he was rather a closet scholar, an unusual type in a tropical country; yet his tropical career was indubitably a success. For in spite of his rather shy and seemingly hesitative demeanour and his unathletic and frail stature, he will be long remembered as a man of character, faith and firmness who, though never striving for a high position and glory, stood for his task like a man, once responsibility was laid upon his shoulders. For if ever he seemed hesitative, this was due to his strong self-criticism, his mild and impartial opinion of others, rather than to any weakness.

He was unusual insofar as he was one of those rare men who know exactly the limits of their innate capacities; and this was a greatness for which I have admired him ever more as we grew older together. He had himself incessantly under control, and he was strictly honest and unimpeachable. These features made him a meritorious president of some important local societies, an accurate editor of that beautiful monthly "De Tropische Natuur", and above all a respected member of the Rotary, for which he some time was an acting district governor.

It may be stated without exaggeration that his firm attitude during the Japanese occupation saved the Botanic Garden of Bogor from being wiped away and becoming a tool in inexperienced hands. In those days he fought for his duty with great courage and many a family owes him a debt of gratitude for his unselfish support. All his life he lived up to the sense of the quotation he chose for a motto to one of his well-considered addresses which often betrayed his wide interest and range of reading: *Quidquid agis, prudenter agas et respice finem.*

H. J. LAM.

REVIEWS.

STRAUSBAUGH, P. D. & E. L. CORE, Flora of West Virginia, part I. West Virginia University Bulletin, series 52, no. 12-2, June 1952, 273 pages, many ill.; part II. idem, series 53, no. 12-1, June 1953, 296 pages, many ill.

The editor has received the first and second fascicle of a treatise of the vascular plants of West Virginia. According to the preface this flora, when complete, will present descriptions, illustrations, geographical data and other information, particularly of local interest for the approximately 2000 species found growing without cultivation in that State. The first part contains the Pteridophyta, Gymnospermae, and Monocotyledoneae, the second part the Dicotyledoneae, p.p. (Saururaceae-Leguminosae). Keys are given for genera and species. The rather short descriptions are completed by many for the greater part original line drawings. Nomenclature and sequence are those of the 8th edition of Gray's Manual, 1950, by M. L. Fernald.

S. J. VAN OOSTSTROOM.

GOOD, R., The Geography of the Flowering Plants, XIV + 452 pp., with 75 line drawings, 9 maps in colour and 16 photogravure plates — Longmans, Green & Co., London, New York, and Toronto, 1953 — Price 50/.—

The fact that a second edition of this book follows the first after a lapse of only 6 years is, to my mind, a good sign. It means that the book is valued by many and it means also that plant-geography has not yet fallen entirely into the hands of "experimentalists". I do not mean to say, of course, that phytogeography does not badly need to be tackled from the experimental side, for every student in this field may have learnt a great deal from the publications of such capable scientists as Cain, Dansereau, Braun-Blanquet, and others who have given valuable inside information about the bearing of environment and history on the distribution of plants. But, in a way, they have been walking around the subject as a cat around hot porridge, leaving the reader more or less unsatisfied if he wants to see the main lines.

Without in any way neglecting modern evidence from the experimental side, Good has given us a book, something halfway between a textbook and a handbook, which tries to show those main lines. In his methods he is primarily an alpha-taxonomist and in a world where the other letters of the Greek alphabet are so often prevailing it is comforting to look at a sound overall picture resting on firm facts, trustworthy, open to various interpretations by various readers of different experience and taste, free of the excess of imagination displayed, for instance, by Croizat. In this way, Prof. Good's book is a worthy, and much more complete successor of Hayek's good though all too concise "Allgemeine Pflanzengeographie" of 1926.

The second edition is certainly an improvement of the first without being detrimental to the context. Many plates have been replaced by more suitable ones. Two of the chapters (4 and 20) have been rewritten, but the main subdivision of the work has been maintained which proves that the original one was sound.

The list of references is enormously extended (from 295 to 629 entries!) and many passages in the text itself show that this is not a mere addition of titles. In many cases the book is really astonishingly up to date (cf fig. 33, in which Nothofagus is already shown as occurring in New Guinea and New Caledonia, the latter a discovery of 1951; also Plate 4, Floristic Regions, which correctly includes the Malay Peninsula in the Malaysian area).

Of course, every specialist can find omissions and little mistakes. These are inevitable in a work of great scope like this one. They are not of a nature to be mentioned here. The author will doubtless be better supported by being privately informed of them. For this is a task which can hardly be expected to be mastered by a single man and, as it is, the work can be best touched up by international cooperation. The main thing is that Prof. Good has been laying the foundation in an admirable way, stressing what has interested him for long years, viz the discontinuous areas which are the rough material for any great book on the distribution of plants. I regret, though, that he has not made a more ample use of polar projections. The favoured Mollweide Homographic Projection, which shows the entire surface of the Earth on a single ellipse seems less suitable for certain Pacific areas.

H. J. LAM.

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